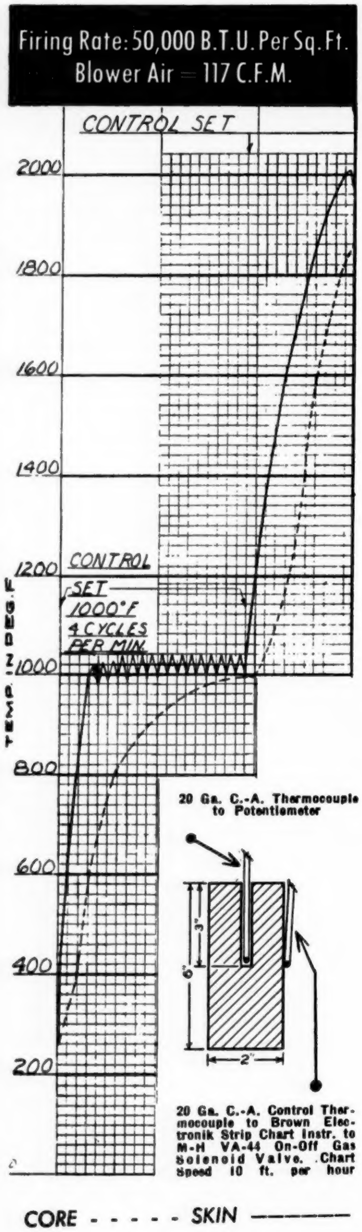
William Hunt Eisenman 1886 - 1958

ASM

Metals Review

INSTANTANEOUS HEAT with

Holden Combustion System



INSPECT THIS PROVEN OPERATION AT OUR DETROIT PLANT

THE HOLDEN LUMINOUS WALL FIRING SYSTEM IS A METHOD OF UNIFORMLY APPLYING INSTANTANEOUS HEAT TO A PART TO BE PROCESSED.

Low Thermal Storage

A POSITIVE SOURCE OF RADIATION, TRANSFERRING MAXIMUM AMOUNT OF HEAT DIRECTLY TO THE WORK WITH NEGLIGIBLE THERMAL STORAGE IN THE FURNACE STRUCTURE. THIS MEANS RAPID STARTING, RAPID COOLING AND RAPID RE-STARTING

Flexibility

A TYPICAL EXAMPLE OF RAPID HEATING IS SHOWN ON THE GRAPH (Left). FIRING 50,000 BTU PER SQ. FT. THE FOLLOWING TEMPERATURES WERE OBTAINED—

1. Up to 1000° F. (10 min. lag 800 to 1000° F.)
2. Up to 1975° F. (3 min. lag)
3. 1975° F. to 2275° F. (3 min. lag)

CONVERSELY, THE REFRACTORY WALL HAS NO HEAT STORAGE SO WHEN GAS IS SHUT OFF AND AIR ALLOWED TO BLOW THROUGH FURNACE WALL, THE WALL IMMEDIATELY ASSUMES TEMPERATURE OF INCOMING AMBIENT AIR.

Advantages

LUMINOUS WALL—INSTANTANEOUS HEATING OFFERS—

1. Greater over all heating efficiency—more than any other type gas furnace
2. 40% less fuel consumption—average day
3. Rapid furnace heating—temperatures of 1000 to 2000° F. obtained within time cycle of 1 to 10 min. using 50,000 BTU per sq. ft.
4. Rapid furnace cooling—no refractory spalling
5. Increased refractory life—graph shows tests conducted in unit over 3 years old operated at temperatures to 2300° F. without refractory replacement

Increase your Profits

MANY INDUSTRIAL HEATING PROCESSES USE A LARGE PROPORTION OF HEAT AND TIME IN ACHIEVING OPERATING TEMPERATURES DUE TO THERMAL STORAGE IN REFRACTORY LINING. REDUCE EXCESSIVE FUEL AND LABOR COSTS WITH HOLDEN LUMINOUS WALL AND MAKE EXTRA PROFITS! WRITE FOR TECHNICAL BULLETIN 209

WHY NOT MAKE THIS PART OF YOUR FORWARD PLANNING FOR 1958?

THE A. F. HOLDEN COMPANY

3 F.O.B. Points for Holden Metallurgical Products

EXECUTIVE OFFICES AND PLANT	EASTERN PLANT	WESTERN PLANT
14341 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN	460 GRAND AVENUE, NEW HAVEN 13, CONN.	4700 EAST 48th STREET LOS ANGELES 58, CALIF.

Metals Review

The News Digest Magazine

June 1958
Vol. XXXI, No. 6

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio: G. M. Young, President; C. H. Lorig, Vice-President; R. H. Aborn, Treasurer; A. O. Schaefer, Secretary pro tem; G. A. Fisher, Carl E. Swartz, John Hollomon and E. E. Stansbury, Trustees; D. S. Clark, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Effective January 1959, subscription $6.00 a year in U. S. and Canada; foreign $7.50. Single copies $1.50. Entered as Second Class Matter, July 26, 1930 at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers from overseas, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

CONTENTS

Important Lectures

Departments

ASM Review of Metal Literature

A MESSAGE FROM THE PRESIDENT

To All Chapter Chairmen, Vice-Chairmen and Secretaries

It was with deep sorrow that we learned that our beloved Secretary, William Hunt Eisenman, passed away following a heart attack on May 30, 1958.

His death, while on a brief vacation in California, came after a strenuous year of chapter visits coupled with greatly increased responsibilities associated with the construction of the new Headquarters Building and the starting of the first Southwestern Metal Congress and Exposition. Though away from his office the steady flow of correspondence revealed that, to the end, his ever active and creative mind continued to plan for the future.

Under his leadership during the past 40 years the Society grew from a small group of 12 men to a membership which is now approaching 30,000 with 106 chapters. He recognized the need to increase the breadth of metallurgical knowledge. Through his ability to successfully implement this vision he has created the leading metals engineering society of the world.

Bill dedicated his life to the task of building the A.S.M. into the Society that it is today. I know that it would be his wish that each one of us accept additional responsibility in whatever capacity we are serving the Society. By so doing we shall continue to increase the breadth of A.S.M. which he faithfully served for so many years and for which he expended his almost limitless energy.

Because of his many years of experience and his tremendous capacity for work, Bill personally accomplished far more than any other one person could normally do. His loss is therefore doubly great because he functioned as both a secretary and a manager. In filling the vacancy occasioned by his death it has been realized that in reality there are two positions to be filled.

The Constitution requires that a vacancy on the Board of Trustees must be filled. In accordance with this requirement Mr. A. O. Schaefer, a Past President of the Society, has accepted the appointment as Secretary for the balance of the term of office of W. H. Eisenman. This term expires at the close of the annual meeting in October of this year. The Board feels that the Society is most fortunate in securing the services of Mr. Schaefer who is a busy executive, but a man who has always been devoted to the welfare and progress of A.S.M.

While this appointment fulfills the requirement of the Constitution, it cannot provide the day-to-day management of the Headquarters activities. The staff that Bill assembled in the Headquarters Office is composed of a talented group of men and women who are effectively handling a variety of specialized activities in which the Society is engaged. As in every business it is essential for efficiency that varied activities be coordinated. Therefore the Board considers it essential that they appoint a manager pro tem.

In consideration of the long experience in Society affairs and the close association with Bill in many diverse phases of Society work the Board appointed R. T. Bayless to this temporary position. This is in addition to his present position as Assistant Secretary of the Society. In his capacity as temporary manager, Mr. Bayless will be counselled by a group, appointed by the Board, that has had extensive experience in the development of A.S.M. This council is composed of Mr. A. P. Ford, Miss E. G. Gardner, Dr. Taylor Lyman, Mr. Ernest E. Thum and Mr. Chester L. Wells.

Many of the detailed matters pertaining to the office of the Secretary have for years been taken care of by Bill's outstandingly efficient secretary, Miss Evelyn G. Gardner. The Board recognizing the valued contributions which she has made and wishing to derive the fullest benefit from her abilities and talent have appointed her Secretary to the Board of Trustees. She has also been appointed the Secretary of the A.S.M. Foundation for Education and Research.

Some time ago the officers of the Society and the Constitution Committees, after thorough study, recommended that at some time it would be necessary to separate the secretarial duties from those of Headquarters management. The present Board of Trustees has adopted a recommendation for amendments to the Constitution. These are described in this issue of *Metals Review* (p. 9-11) and their adoption will be acted upon at the Annual Meeting on October 29, 1958. The proposed amendments provide for a Secretary whose duties will be as described in the Constitution and for a Managing Director who, responsible to the Board, will direct the Headquarters activities of the Society.

At this time one of the very important activities of the Society is the construction of the new Headquarters Building. This project requires considerable attention and Bill had been personally following it. Accordingly the Board has requested the Vice-President to oversee this activity.

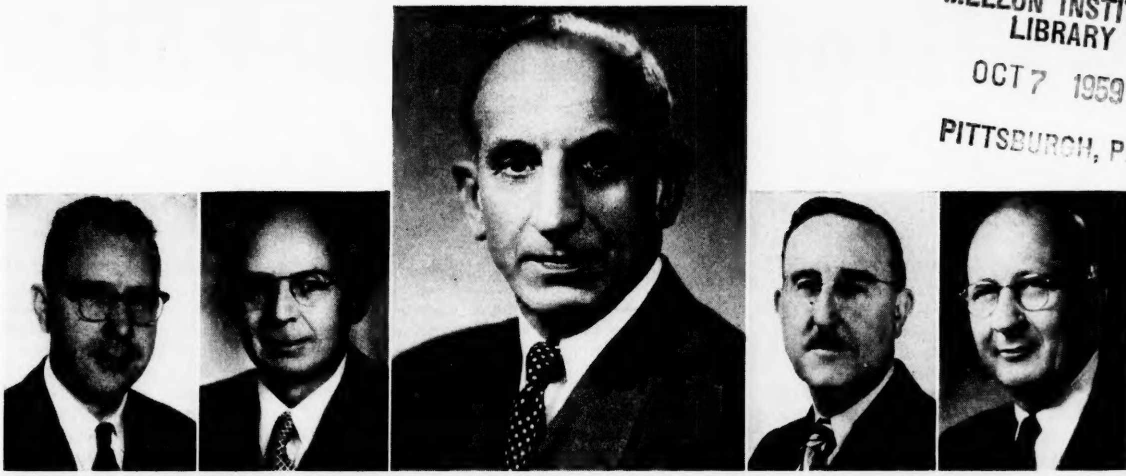
There have been many inquiries from Chapter Officers, individual members, and business organizations, asking in what manner they might contribute toward a memorial for William H. Eisenman. In response to these requests the Board of Trustees will place such gifts in a special fund for this purpose. It has of course not been possible as yet to consider the form that this memorial might take, but in due time the matter will be thoroughly studied by the Board.

Most sincerely,
G. M. Young
President

G. M. Young

June 10, 1958

Many chapters and some individuals have requested an opportunity to participate in the establishment of a memorial for William H. Eisenman. In response to these requests, the Board of Trustees will place such gifts in a special fund for this purpose.



E. R. Parker *W. C. Crafts* *C. H. Lorig* *W. E. Jominy* *M. Scheil*

Officers Nominated for 1958-1959 Season

NOMINATIONS for new national officers of the American Society for Metals have been announced by the Nominating Committee, which met on May 23, 1958, in Chicago, under the chairmanship of Robert F. Thomson, General Motors Corp.

C. H. Lorig, currently serving as vice-president, was nominated for president, Walter Crafts was nominated for vice-president, and M. A. Scheil and Earl R. Parker were proposed as additions to the Board of Trustees.

As required by the Constitution of the American Society for Metals, the Past Presidents Committee met in the third week of May and nominated William H. Eisenman secretary of the Society for the term 1958-1960, his 21st nomination for this office. He was duly notified and had accepted. Those voting were: G. M. Young, chairman, D. S. Clark, A. O. Schaefer, G. A. Roberts, J. B. Austin, R. L. Wilson and John Chipman.

Mr. Eisenman's death on May 30, 1958, necessitated that this committee reconvene, which a quorum did on June 7, 1958, and unanimously nominated Walter E. Jominy for the office of secretary for the term 1958-1960. Those voting were: G. M. Young, chairman, D. S. Clark, A. O. Schaefer, G. A. Roberts and R. L. Wilson.

In accordance with the Constitution of the American Society for Metals, additional nominations for any of these posts may be made by written communications addressed to the secretary of the Society and signed by any 50 members. If no such additional nominations are received prior to July 15, nominations shall be closed and at the annual meeting in October 1958 the secretary will cast the unaminous vote for the members for these candidates.

C. H. Lorig

Clarence H. Lorig, selected as nominee for president, received a Ph.D. degree from the University of Wisconsin in 1928. He was employed on different occasions as metallurgist for the French Battery Co., Stowell Co., Ladish Drop Forge Co. and Pelton Steel Casting Co., prior to and after completing his graduate work. Later he accepted an assistant professorship in mechanical engineering at Drexel Institute. Since 1930 he has been associated with Battelle Memorial Institute, first as supervising metallurgist connected with the process metallurgy department, later as assistant director of the Institute. He is presently technical director of the Institute.

Dr. Lorig has received a distinguished service citation for accomplishments in the metallurgical engineering field from the University of Wisconsin. He has made outstanding contributions to the foundry industry and stimulated and guided much research in process metallurgy. He is credited with research leading to several patents on alloys and metallurgical processes. Dr. Lorig is also the author of numerous articles and papers which have appeared in scientific and technical journals. He served as national treasurer A.S.M. from 1955 to 1957.

Walter Crafts

Walter Crafts, selected as nominee for vice-president, is associate director of research, Metals Research Laboratories, Electro Metallurgical Co. Mr. Crafts graduated from Yale University in 1924 and Massachusetts Institute of Technology in 1926. He was employed at the Illinois Steel Co. from 1926 to 1929 and since has been engaged in research on alloy steels at Union Carbide and Carbon Research Laboratories and later at Electro Metallurgical Co.

Among the research projects he has handled has been the development of various alloy addition agents used in making steel and cast iron. His work on steelmaking and deoxidation, as well as on the hardenability and properties of alloy steels, has been described in many papers presented before the A.I.M.E. and A.S.M. Mr. Crafts is co-author of two books, one on "Hardenability and Steel Selection", the other on "Alloys of Iron and Chromium".

He was chairman of the Buffalo Chapter in 1942-1943 and has served on the Publications Committee, both as a member and as chairman (1947).

Earl R. Parker

Earl R. Parker, nominee for the office of trustee, is professor of metallurgy at the University of California, Berkeley. He received his metallurgical engineering degree in 1935 from the Colorado School of Mines. Work history includes positions as research metallurgist with General Electric Research Laboratories from 1935 to 1944, associate professor of metallurgy, University of California, 1945 to 1950, professor of metallurgy, University of California, from 1950 to the present, and chairman of the Division of Mineral Technology at University of California from 1953 to 1957.

Prof. Parker has written more than 60 technical publications and he is the author of the book "Brittle Behavior of Engineering Structures". He is a member of several technical societies and was awarded the

(*Continued on p.* 8)

William Hunt Eisenman

HERE WAS A MAN with his eyes on tomorrow—and all of the tomorrows will continue to benefit from the results of his long-range vision, from his complete dedication and devotion to an ideal that a greater future can be built out of the dreams of today.

William Hunt Eisenman and the American Society for Metals—names synonymous each to the other—the one completely absorbed in the other. William Eisenman has left a heritage that the pride and devotion and remembrances of his constituents are bound to uphold and to continue to make grow into his biggest dream—the A.S.M. of Tomorrow. It will be built upon the firm 40-year foundation of Mr. Eisenman's genius and vision.

Because the two have been so inseparably bound together, the story of A.S.M. is therefore the story of W. H. Eisenman, the accomplishments of A.S.M. tell the story of his life.

During 40 years as national executive secretary with the American Society for Metals, William Hunt Eisenman saw the organization grow from a single group of 200 members in Chicago to an organization of 106 chapters spreading over industrial United States and Canada and totaling more than 30,000 members. While the growth of the American Society for Metals is a natural reflection of the growth of the metals industry in America, it also is a direct reflection of the leadership and the guidance of "Bill" Eisenman.

In the Beginning

The whole thing started in 1918, when he was asked by Theodore Barker, owner of a heat treating business in Chicago, to act as general manager for the newly organized American Steel Treaters Society. Mr. Eisenman was then in his early 30's, superintendent of public schools in Elmhurst, Ill., a suburb in which Mr. Barker lived, and just recently married to Mildred Randle, an Elmhurst teacher.

Born in Jamestown, Ohio, he enrolled in Kenyon College, planning to study for the ministry and to follow in his father's footsteps. His interest took a scientific turn, however, and he went on to receive a master's degree in chemistry at Stanford University. After graduation and up to taking the job offered by Barker his experience had been completely in the field of education.

The Steel Treaters

It was his reputation as a progressive educator which prompted Barker to offer him the job. The new Society, numbering only 200 metallurgists, salesmen, technicians and other men in the metal industry in the Chicago area, had originally been a section of the Steel Treating Research Club of Detroit, organized at the beginning of World War I to spread information about the heat treatment of munitions amongst civilian industry which knew little or nothing about alloy steels. In 1918 the Chicago section seceded from the parent group, but it was obvious that it would need the aid of an experienced man to make it grow. The prime objective of the association was, as always, the exchange and dissemination of information about manufacture of high-grade metals. Such a process could best be handled by an experienced educator and teacher with a scientific background.

This description fitted W. H. Eisenman. As a teacher he realized the need for more progressive standards in the dissemination of information, whether it be metallurgical data distributed to plant technicians, or chemical equations explained to school girls. He had, moreover, a strong instinct for business organization and an ability to formulate a plan quickly, organize the steps to carry it out, and follow through straight to his objective. These, coupled with tremendous energy and devotion to his work, were assets of the Society's new executive head.

Mr. Eisenman's most important job during the first years of the new Society was the organization of chapters in other metalworking areas throughout the country. Traveling to cities where metal production and metalworking were important, he would explain the aims and hopes of the Society to important industrialists and, often spurred by his enthusiasm, he would leave with a new chapter already in the first stages of development. In the course of a year and a half, new chapters were added at the rate of over one a month. At the present time there are 106 chapters in the United States and Canada. Each chapter is financially solvent, receiving approximately one-third of all dues paid by members. Each one has its own program adapted to the needs of the locality, establishes lecture courses, and generally promotes the better understanding and treatment of metals and alloys of all sorts. Each therefore, is an independent "state" in a "democratic union"—a unique organization among engineering societies which has much to do with the success of the whole.

In the first year of his management Mr. Eisenman realized that financial stability would require other sources of income than dues from the members. He therefore established the National Metal Exposition which has been held each year since that time, and has grown into one of America's largest industrial expositions. Its success resulted in Mr. Eisenman's election as president of the Association of Exhibit Managers in 1932 and his continued re-election until 1946 when he was named general councilor of the group.

The Schism Healed

Meanwhile the group centering in Detroit was also expanding and it was found that each of the groups had separate chapters in numerous American cities—a clear waste. Largely through the efforts of Albert E. White, head of the metallurgical department at the University of Michigan, the two groups were united, and formed what was then known as the American Society for Steel Treating. The first convention of the merged group was in Philadelphia in 1920; Colonel White was the first president, and William H. Eisenman the national secretary. Office of the new Society was to be in Cleveland, thus avoiding jealousy between the Detroit and Chicago groups. In 1927 the Society purchased the stone mansion at 7301 Euclid Ave. from the Norton family and converted it into business quarters. It goes without saying that this union of the two factions, one reporting to Detroit and the other reporting to Chicago, was an essential step in the future progress.

New Publications

If an idea was a good and sound one, Mr. Eisenman would back it strongly despite setbacks and opposition. Since the beginning the Society had published a monthly book called *Transactions* and this was a wonderful means of broadcasting information to the members. It gradually became devoted almost completely to describing new researches in the science of metals, yet by 1930 it was apparent that 75% of the members of the Society were in *production* rather than in research. Therefore Mr. Eisenman promoted the idea with

1886 - 1958
The Man and His Work

his board of trustees that an engineering magazine be established; consequently *Metal Progress* was first published in September of 1930, and headed straight into the depression. Mr. Eisenman's financial direction was such that the magazine earned a little money in 1931 and '32 and lost a little less in 1933, '34 and '35. The big hurdle at the time was psychological; we were in a terrific depression; *nothing* could succeed! However, Mr. Eisenman's faith in the magazine was constant; it would be one of the most effective means of distributing metallurgical data to the Society members, and he steadfastly held that it soon would pay for itself. All A.S.M. members know that it has since become a resounding technical and financial success. Simultaneously, *Metals Review* was established as a monthly tabloid carrying news of activities of local chapters and the national organization.

Birth of "The Bible"

Another outstanding achievement of the Society, originating in Mr. Eisenman's mind, is the monumental "A. S. M. Metals Handbook" known throughout the industry as the "Bible of the metal industry". It started out in 1924 as a collection of "recommended practices" in looseleaf notebook form; by 1929 the Handbook was bound in a small volume. Later editions appeared in 1930, 1933, 1936, 1939, and in 1948 (the last-mentioned reaching 1450 pages, 8 x 11 in. in size). Supplements to this edition were issued in 1954 and 1955 and at present a considerable staff is working on a complete revision. Each member of the Society received a copy of the current handbook, free of charge. The book also has a very large sale to industry and libraries throughout the world.

The method of gathering authoritative information and boiling it down to its essentials so highly developed by the Handbook staff so impressed the officials at Wright Air Development Center that the Society was asked early in 1957 to prepare a similar handbook or design manual for men in the aircraft and missile industries giving them the essential data whereby high-strength and high-quality castings can be used in their work.

Indexing and Searching

A very good example of his persistent support of a sound idea is the development of the basic plans for the A.S.M. Metals Information Center. Realizing the need for prompt abstracts of current engineering literature, he suggested in 1930 that *Metal Progress* carry such a service. It did so in the early years of publication but cuts during the depression forced its discontinuance. Ten years later the idea was revived as the A.S.M. Review of Metal Literature, published monthly in *Metals Review*. The continuing problem of utilizing this vast accumulation of material in scientific literature recently resulted in A.S.M. sponsorship of a pilot operation to test the feasibility and utility of computing-type equipment for literature searching and indexing. This five-year, \$75,000 operation is now being conducted by Western Reserve University. Together with the abstract service, it will serve as forerunner of the A.S.M. Metals Information Center, the culmination of Mr. Eisenman's original idea nearly 30 years ago.

Paralleling this work the American Society for Metals has become the largest publisher of technical books for the metal industry in the world. Its present catalog contains 93 titles and the number is increasing at the rate of about one a month.

A. S. M. was also the principal sponsor and financial "angel" of *Acta Metallurgica*, an international journal on the highest scientific level.

In the field of metallurgical education, Mr. Eisenman's direction has been of paramount importance. The A.S.M. Foundation for Education and Research, with an endowment of \$650,000, is the largest foundation ever established by a technical society from its own resources. This Foundation grants 56 scholarships of \$400 each through 56 different colleges in the United States and Canada. The Foundation, as well as A.S.M., is playing a prominent part in the effort to stimulate the interest of secondary students in metallurgy as a career. Each year \$15,000 is set aside for awards, through the National Science Teachers Association, to junior and senior high-school students for projects in any field of science or mathematics. At the college level, a teaching award of \$2000 is made annually to an outstanding young professor of metallurgy.

The National Metal Exposition, held annually since the Society's early beginnings, is not only an outstanding success but a definite service to industry. Under Mr. Eisenman's direction and meticulous attention to detail it has grown to one of the largest and most influential industrial "shows" in the country. In alternate years since 1930 a Western Metal Exposition has been held in California; this idea has now been extended to another important and growing industrial area of the country, with the first Southwestern Metal Exposition held in Dallas, Tex., in May 1958.

Congresses

The congresses held concurrently with each of these expositions are conducted with the same vision and careful attention to detail as the other activities Mr. Eisenman has visualized and sponsored. Technical meetings of the highest caliber are held not only by the American Society for Metals but by other cooperating technical societies of similar interests. The U. S. Atomic Energy Commission has cooperated with the A.S.M. in holding seven conferences on metallurgical aspects of atomic energy. Educational lectures and scientific seminars round out the Metal Congress programs.

Extension of this idea to the world scene was conceived and carried to unqualified success with the holding of the first World Metallurgical Congress in 1951. The second World Metallurgical Congress in November 1957 was attended by more than 500 metallurgists and scientists from 38 free countries of the world. Many of them participated in carefully planned preliminary inspection tours of the U. S. industrial plants and laboratories in the metals field, all under the sponsorship of the A.S.M. A project in an advanced stage of organization at his untimely death is the "World Information Exchange in Metallurgy"—an informal cooperative effort by over 100 national societies scattered over the free world to exchange information promptly about new and important happenings in the metals industry.

All of these far-reaching educational and scientific activities have been made possible by Mr. Eisenman's business acumen and foresight. Starting from scratch in 1918, and without receiving endowments of any sort through the years, the Society has accumulated net assets of more than \$4 million; the annual

budget is in the neighborhood of $2½ million; the chapters collectively have independent assets of half a million more. All this has been done without ever raising the Society's original membership dues of $10 per year.

A. S. M. of Tomorrow

Throughout his 40 years with A.S.M., Mr. Eisenman directed its activities with an eye to the future development of the Society and its continued growth in stature and significance. His 1954 blueprint for the future expansion of A.S.M.—"The A.S.M. of Tomorrow"—is already in the first stage of realization. This will include a new national headquarters, the first of seven new buildings to be built to house the expanding organization.

The Metals Engineering Institute, a new A.S.M. division, is already filling a vital need in the field of metallurgical education at the junior college level. Through on-the-job and home-study courses supplied by the Institute, skilled men in the metals industries have the opportunity to become metal technicians, while engineers may study supplementary or new material in their field. Another project, the A.S.M. Metallurgical Seminars, now in formative stages with one successful meeting as a starter, will provide intensive but brief study courses at an advanced level for working engineers, in the fields of new metals, methods and processes.

More ambitious than these projects are Mr. Eisenman's plans for creating an A.S.M. Metal Science University which would offer courses in metal science only, probably beginning with third-year university level studies and continuing through post-graduate courses.

Also within the plans of the "A.S.M. of Tomorrow" is the establishment of a research institute whose primary objective would be the solution of *general* problems of the whole metallurgical industry, rather than items of applied research for any individual firm or small segment. The latter type of activity is widely distributed throughout American research laboratories, whether governmental, university, or privately endowed. However, America has no organization, such as is fairly common in Europe, where fundamental problems of the whole industry are being attacked—a gap which A.S.M. hopes eventually to fill.

These plans for the future are not merely blueprints outlined on paper. Mr. Eisenman's enthusiastic and vigorous support infected all who were associated with him, and there is little doubt among A.S.M. members that the "A.S.M. of Tomorrow" will be completely realized according to plan.

National Officers-1958-1959

(*Continued from p. 5*)

Mathewson Gold Medal of the A.I.M.E. in 1956 for the best research publications appearing in the A.I.M.E. Journal during the preceding three years.

Prof. Parker delivered the 1957 Edward De Mille Campbell Memorial Lecture on "Modern Concepts of Flow and Fracture" during the National Metal Congress in Chicago. (The complete text of this lecture is included in vol. 50, Transactions, A.S.M., 1958, p. 52.)

Walter E. Jominy

Walter E. Jominy, chief metallurgist, research, Chrysler Corp., until his retirement early this month, was the selection of the Past Presidents Committee to fill the nomination for secretary for a two-year term which was left vacant by Mr. Eisenman's death.

Dr. Jominy graduated from the University of Michigan with a chemical engineering degree and received his M.S. degree in 1916. He joined Studebaker Corp. as a metallographer in 1916, later became associated with the U. S. Bureau of Aircraft Production as a senior metallurgical inspector during World War I. He was a metallurgical engineer from 1918 to 1920 with Packard Motor Car Co. and was associated with Studebaker Corp. in charge of chemical and metallurgical laboratories from 1920-1923. He then became research engineer in department of engineering research at University of Michigan, a position he held until 1931 when he joined A. O. Smith Corp. as research metallurgist. He started in the research laboratories at General Motors Corp. in 1934, and in 1941 he joined the Chrysler Corp.

In 1944 Dr. Jominy received the Albert Sauveur Award of the A.S.M. for "metallurgical achievement which has stimulated other organized work along similar lines to such an extent that a marked advance has been made in metallurgical knowledge", a tribute to his work in developing the well-known end-quench hardenability test which bears his name. In 1948 he was given a Distinguished Service Award by the Society for "meritorious contributions to the progress in alloy steel".

Dr. Jominy has also served A.S.M. as a member of the Publications Committee.

M. A. Scheil

M. A. Scheil, director, metallurgical research, A. O. Smith Corp., holds a B.S. degree in chemical engineering and a M.S. degree in metallurgy from the University of Wisconsin. He started his career with Gisholt Machine Co. in 1927 as a metallurgical chemist, joining A. O. Smith Corp. in 1929 as a metallurgist and progressing to his present position as director in 1940.

Mr. Scheil has been active in Milwaukee Chapter activities as program chairman, vice-chairman and chairman (1942-1943), and also served on the Chapter's war production committee from 1942 to 1945. He contributed papers to both the 1948 edition of the Metals Handbook and to the Handbook Supplement printed in 1954, and has served A.S.M. nationally as a member of *Metal Progress* Advisory Committee, as a member of the Nominating Committee and as chairman and co-chairman of technical sessions held during the National Metal Congress in 1952. He was also a conferee during the 2nd World Metallurgical Congress last year. Many chapters have heard him speak and his prolific pen has produced numerous papers for A.S.M. and other publications. His is also a well-known name in other technical societies, many of which he has served in committee functions and for which he has written many papers. He has also delivered many lectures before the local sections of these Societies.

Mr. Eisenman Granted Degree Posthumously

By Western Reserve

An honorary degree of Doctor of Laws was conferred posthumously upon William Hunt Eisenman by Western Reserve University during commencement services held June 11. The citation, read by John Schoff Millis, president of Western Reserve, and presented to Mrs. Eisenman, is as follows:

"William Hunt Eisenman, scientist, administrator. servant of your profession and of your community; because you have given your unusual talents and energy to the foundation and development of the professional organization serving the scientific, technical and educational needs of one of our country's greatest industries; because you have pioneered as a teacher and writer in the field of technical continuing education; because you have served this University in its pioneering efforts in the field of the scientific documentation through your deep interest and substantial support, we delight to honor you.

"By virtue of the authority vested in me, I confer upon you the degree of Doctor of Laws, honoris causa, and admit you all the honors, rights, privileges and obligations. In token thereof we invest you with the hood of the University and ask you to accept this diploma."

Proposed Constitution Changes

As required by the Constitution of the American Society for Metals, notice is hereby given of amendments to be proposed, for membership approval, at the Annual Meeting of the Society at 9:00 a.m., Wednesday, October 29, 1958, in the Ballroom of the Statler-Hilton Hotel, Cleveland, Ohio. Changes and additions are shown in boldface. Deletions are indicated by asterisks.

ARTICLE VII

BOARD OF TRUSTEES

PRESENT CONSTITUTION

Constituency of Board

Section 1. The affairs of the Society shall be managed by a Board of Trustees of nine (9) members of whom the President, Vice President, Secretary and Treasurer of the Society shall be members ex officio.

Appointment of Committees

Section 3. The Board of Trustees may appoint such committees other than those mentioned in Article XIII and such subordinate officers as it shall deem proper, and shall fix their duties, fill vacancies in their number, and at pleasure remove them. Nothing herein contained shall be deemed to give the Board any powers inconsistent with the other sections of the Constitution.

PROPOSED CHANGES AND ADDITIONS

Constituency of Board

Section 1. The affairs of the Society shall be **directed** by a Board of Trustees of nine (9) members **including** the President, Vice President, Secretary, Treasurer **and the immediate Past President of the Society.**

Appointment of Committees

Section 3. The Board of Trustees may appoint such committees other than those mentioned in **Article XIV** and such subordinate officers as it shall deem proper, and shall fix the duties, fill vacancies in their number, and at **discretion** remove them. Nothing herein contained shall be deemed to give the Board any powers inconsistent with the other sections of the Constitution.

ARTICLE VIII

OFFICERS OF THE SOCIETY

PRESENT CONSTITUTION

Secretary

Section 4. The Secretary shall act as recording and corresponding secretary of the Society. He shall keep or cause to be kept full and complete record of the membership of the Society and the representatives of member firms or corporations and shall check his records at frequent intervals with the records of the secretaries of the local chapters. He shall act as Secretary at all meetings of the Board of Trustees and of the members of the Society and shall perform such other duties as shall be delegated to him by the Board of Trustees. The office of the Secretary shall be at the principal office of the Society.

PROPOSED CHANGES AND ADDITIONS

Secretary

Section 4. The Secretary shall act as recording and corresponding secretary of the Society. He shall keep or cause to be kept full and complete record of the membership of the Society and the representatives of member firms or corporations and shall check his records at frequent intervals with the records of the secretaries of the local chapters. He shall act as Secretary at all meetings of the Board of Trustees and of the members of the Society and shall perform such other duties as shall be delegated to him by the Board of Trustees.***

ARTICLE IX

NOMINATION, ELECTION AND TERM OF OFFICERS

PRESENT CONSTITUTION

Nomination and Election

Section 1 (a). Selection of Committees for Nomination of Officers. A Nominating Committee shall be appointed each year. Each local chapter in good standing which is eligible to have a member on the Nominating Committee shall annually select one candidate for a Nominating Committee from the local chapter membership in such manner as the local chapter shall deem fit, and the name of the candidate shall be forwarded to the President prior to March 1st of each year. From the list of eligible candidates suggested by the various local chapters, the President shall appoint a Nominating Committee of nine (9) members. In appointing the Nominating Committee the President shall select members thereof in such a regional manner as to be equitable for all chapters of the Society. Any chapter having a member on the Nominating Committee in any given year shall not be eligible to have a member on the Nominating Committee during the two succeeding years and no member of the Nominating Committee may serve two or more successive years. The President shall designate one of the members of the Nominating Committee as Chairman of the Committee. Seven (7) members of the Nominating Committee shall constitute a quorum.

PROPOSED CHANGES AND ADDITIONS

Nomination and Election

Section 1 (a). Selection of **Committee** for Nomination of Officers. A Nominating Committee shall be appointed each year. Each local chapter in good standing which is eligible to have a member on the Nominating Committee shall annually select one candidate for a Nominating Committee from the local chapter membership in such manner as the local chapter shall deem fit, and the name of the candidate shall be forwarded to the President prior to March 1st of each year. From the list of eligible candidates suggested by the various local chapters, the President shall appoint a Nominating Committee of nine (9) members. In appointing the Nominating Committee the President shall select members thereof in such a regional manner as to be equitable for all chapters of the Society. Any chapter having a member on the Nominating Committee in any given year shall not be eligible to have a member on the Nominating Committee during the two succeeding years and no member of the Nominating Committee may serve two or more successive years. The President shall designate one of the members of the Nominating Committee as Chairman of the Committee. Seven (7) members of the Nominating Committee shall constitute a quorum.

PRESENT CONSTITUTION

A Committee for Nomination of a Secretary for the Society shall be appointed each year in which the term of office of the Secretary expires. It shall consist of seven (7) members. The President shall be a member and shall serve as Chairman of the Committee for nomination of a Secretary, and shall appoint the six (6) persons who have most recently held the office of President and who are living. In the event that there are fewer than six (6) of the past presidents of the Society who are living and qualified to serve on the Committee for Nomination of a Secretary, any other member or the representative of any member of the Society shall be eligible for membership thereon. Five (5) members of the Committee shall constitute a quorum.

Prior to April 15th of each year, the names of the Nominating Committee and of the Committee for Nomination of a Secretary for the Society, if any, shall be published by the President for the benefit of the members of the Society in one of the publications of the Society. If for any reason there should be a vacancy on either the Nominating Committee or the Committee for Nomination of a Secretary, after appointment and before the conclusion of its duties, the President shall fill such vacancy by appointment of any person who would originally have been eligible to serve in the place created by such vacancy.

(b) Duties of Nominating Committee and Committee for Nomination of a Secretary. On any day during the third full week in the month of May, the Nominating Committee shall meet at a place designated by the Chairman and shall name one candidate for each office which shall become vacant at the close of the next succeeding annual meeting of the members, except for the office of Secretary. During the same period in each year in which the term of office of the Secretary expires, the Committee for Nomination of a Secretary for the Society shall meet at a place designated by its Chairman and shall name one candidate for the office of Secretary. As an aid in making nomination, each Committee, and particularly the Chairman of the Committee, may canvass the executive committees of local chapters for written endorsements for consideration by the Committee. Each Committee shall also give consideration to written endorsements forwarded to it for its consideration by individual members or representatives of members of the Society. Endorsements submitted by a local executive committee to the Nominating Committee shall be confined to members of its local chapter or representative firms or corporations which are members of its local chapter, but an individual member or representative of a member of the Society may suggest any qualified members or representatives of members of the Society for consideration by the Nominating Committee. Immediately after the candidates are thus nominated each Committee shall report the names of its nominees to the Secretary of the Society and the report shall be published by the Secretary in one of the publications of the Society not later than June 15th of the same year.

(c) Additional Nominations. After publication of the names of the candidates nominated by the Nominating Committee and by the Committee for Nomination of a Secretary for the Society, if any, and at any time prior to July 15th of the same year, additional nominations for any or all of the vacancies may be made by written communications addressed to the Secretary of the Society and signed by any fifty (50) members and/or representatives of member firms or corporations.

(e) Voting at Special Meeting. If the Secretary receives additional nominations for officers of the Society prior to July 15th, the Secretary shall call a special meeting of the members to vote on all candidates nomi-

PROPOSED CHANGES AND ADDITIONS

Delete entire paragraph.

Prior to April 15th of each year, the names of the Nominating Committee *** shall be published by the President for the benefit of the members of the Society in one of the publications of the Society. If for any reason there should be a vacancy on *** the Nominating Committee *** after appointment and before the conclusion of its duties, the President shall fill such vacancy by appointment of any person who would originally have been eligible to serve in the place created by such vacancy.

(b) Duties of Nominating Committee. *** On any day during the third full week in the month of May, the Nominating Committee shall meet at a place designated by the Chairman and shall name one candidate for each office which shall become vacant at the close of the next succeeding annual meeting of the members. *** As an aid in making nomination, each Committee, and particularly the Chairman of the Committee, may canvass the executive committees of local chapters for written endorsements for consideration by the Committee. Each Committee shall also give consideration to written endorsements forwarded to it for its consideration by individual members or representatives of members of the Society. Endorsements submitted by a local executive committee to the Nominating Committee shall be confined to members of its local chapter or to representatives of firms or corporations which are members of its local chapter but an individual member or representative of a member of the Society may suggest any qualified members or representatives of members of the Society for consideration by the Nominating Committee. Immediately after the candidates are thus nominated, the Committee shall report the names of its nominees to the President of the Society and the report shall be published *** in one of the publications of the Society not later than June 15th of the same year.

(c) Additional Nominations. After publication of the names of the candidates nominated by the Nominating Committee *** and at any time prior to July 15th of the same year, additional nominations for any or all of the vacancies may be made by written communications addressed to the Secretary of the Society and signed by any fifty (50) members and/or representatives of member firms or corporations.

(e) Voting at Special Meeting. If the Secretary receives additional nominations for officers of the Society prior to July 15th, the Secretary shall call a special meeting of the members to vote on all candidates nomi-

PRESENT CONSTITUTION / **PROPOSED CHANGES AND ADDITIONS**

PRESENT CONSTITUTION	PROPOSED CHANGES AND ADDITIONS
nated by such communications and all candidates nominated by the Nominating Committee and by the Committee for Nomination of a Secretary for the Society, if any. The special meeting shall be held prior to the annual meeting and forms of proxies for voting at such special meeting shall be mailed by the Secretary to each member or to each representative of a member firm or corporation at least thirty (30) days prior to the date fixed for such special meeting.	nated by such communications and all candidates nominated by the Nominating Committee. *** The special meeting shall be held prior to the annual meeting, and forms of proxies for voting at such special meeting shall be mailed by the Secretary to each member or to each representative of a member firm or corporation at least thirty (30) days prior to the date fixed for such special meeting.
Qualifications	*Qualifications*
Section 2 (b). No local chapter shall have more than one member or representative of a member on the Board of Trustees during any one year; provided, however, that the Secretary by reason of his membership on the Board shall not bar the local chapter of which he is a member from additional representation on the Board.	Section 2 (b). No local chapter shall have more than one member or representative of a member on the Board of Trustees during any one year. ***
Vacancies	*Vacancies*
Section 4. If a vacancy in an office occurs for any reason, the Board or the remaining members thereof shall select a qualified member of the Society or an individual designated by a member firm or corporation to fill the vacancy either for the unexpired term or until the next election, as the Board may deem right and proper.	Section 4. If a vacancy in an office occurs for any reason, the Board or the remaining members thereof shall **appoint** a qualified member of the Society or an individual designated by a member firm or corporation to fill the vacancy either for the unexpired term or until the next election, as the Board may deem right and proper.
Eligibility for Immediate Re-Election	*Eligibility for Immediate Re-Election*
Section 5. No officer may serve two or more successive terms in the same office, except the Secretary or the Treasurer who may succeed himself as Secretary or Treasurer, as the case may be.	Section 5. No officer may serve two or more successive terms in the same office, except the Secretary or the Treasurer, *** as the case may be, **but not for more than one additional term.**

ARTICLE XI

ADMINISTRATIVE EXECUTIVE

PRESENT CONSTITUTION	PROPOSED CHANGES AND ADDITIONS
(Article XI is new. Succeeding articles are to be renumbered accordingly.)	**Section 1. The Board of Trustees shall appoint a Managing Director to serve as the administrator of the affairs of the Society. In this capacity he shall be accountable to the Board of Trustees. He shall direct the activities of the headquarters staff and shall perform such other duties as are delegated to him by the Board of Trustees within the framework and intent of the Constitution. The office of the Managing Director shall be at the principal office of the Society.**

Article XI To Be Retitled Article XII

Article XII To Be Retitled Article XIII

Article XIII To Be Retitled Article XIV

ARTICLE XIV

STANDING COMMITTEES

PRESENT CONSTITUTION	PROPOSED CHANGES AND ADDITIONS
Section 1. Standing Committees shall be appointed each year by the President, by and with the consent of the Board of Trustees, as soon as possible after the annual meeting; and vacancies in the Standing Committees shall be filled in the same manner. Each Committee shall consist of at least three (3) members who shall all be members of the Society and/or individual representatives of a member firm or corporation. The President and Secretary of the Society shall be ex-officio members of all Standing Committees. The term of office of the members of the Committee shall be fixed by the President by and with the consent of the Board of Trustees; provided that any member of a Standing Committee shall serve not longer than three (3) years or until his successor is appointed.	Section 1. Standing Committees shall be appointed each year by the President, by and with the consent of the Board of Trustees, as soon as possible after the annual meeting; and vacancies in Standing Committees shall be filled in the same manner. Each Committee shall consist of at least three (3) members who shall all be members of the Society and/or individual representatives of a member firm or corporation. The President *** shall be **an** ex-officio **member** of all Standing Committees. The term of office of the members of the Committee shall be fixed by the President by and with the consent of the Board of Trustees; provided that any member of a Standing Committee shall serve not longer than three (3) years or until his successor is appointed.

Article XIV To Be Retitled Article XV

Article XV To Be Retitled Article XVI

Article XVI To Be Retitled Article XVII

Article XVII To Be Retitled Article XVIII

Presents Unusual Corrosion Problems

Mars G. Fontana (Right), Department of Metallurgical Engineering, Ohio State University, Who Spoke on "Unusual Corrosion Problems" at a Meeting in Oak Ridge, Is Shown With Edward C. Miller, Past Chairman of the Chapter

Speaker: M. G. Fontana

Ohio State University

A joint meeting of the **Oak Ridge Chapter** A.S.M. and the local section of the National Association of Corrosion Engineers featured a talk on "Unusual Corrosion Problems" by M. G. Fontana, professor and chairman of the department of metallurgical engineering, Ohio State University.

The first case chosen by Dr. Fontana was that of "the roof which was supposed to last forever". The roof was of aluminum and was "guaranteed" to last, if not forever, at least for the lifetime of the steel structure it covered. Shortly after completion of the building, however, thousands of tiny holes mysteriously appeared in the roof. The steel and the aluminum had made a fine galvanic cell and corrosion occurred under water condensing conditions.

A second example of this type was the very rapid corrosion of steel-stainless steel beer tanks. The usual procedure in the old all-steel tanks had been to line the sides and bottoms with a baked phenolic coating, but, in the new stainless bottomed tanks, only the steel sides were lined. As a result, the small anodic areas presented by holes in the coating covering the steel and the almost infinite cathodic area presented by the stainless steel caused greatly accelerated corrosion.

Dr. Fontana also discussed the knife-line attack by fuming nitric acid of a 347 SS weld. Examples of other types of corrosion were presented, including intergranular, concentration cell and stress corrosion.

A series of slides, taken by Dr. Fontana on off-shore oil rigs in the Gulf of Mexico and refineries in the Caribbean region, comprised the final portion of the program. Dr. Fontana discussed the many very unusual corrosion problems presented by the combination of sea water, salt air and corrosive liquids, and the combinations of protective measures and compromises which must be made.

Winners Honored

At the same meeting, winning entries in the "Career in Metallurgy Night" contest were announced. This contest was open to high-school students attending the Chapter's special meeting for students who were asked to describe in 100 words what the special meeting meant to them.

David Stuckey, a senior at Clinton High School, submitted the winning entry and was awarded a $25 savings bond by Eric Wischhusen, student affairs chairman. Julia Teasley, Austin High School, won the second-place price of $10; Joseph M. Michael, Jr., Austin High School, won third-place price of $5. Four fourth-prize winners each received $2. They were: Buster Sutton, Sweetwater High School; Joseph R. Mack, Austin High School; Annette Frazier, Carter High School; and Bob Mason, Madisonville High School.—**Reported by P. L. Rittenhouse for Oak Ridge.**

Defines Hardness Tests at British Columbia Chapter

Speaker: V. E. Lysaght

American Chain & Cable Co., Inc.

"Hardness and Its Measurement" was the subject of a talk by Vincent E. Lysaght, general sales manager, Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., before the **British Columbia Chapter.**

Mr. Lysaght recalled some of the concepts of indentation hardness testing as performed nearly 60 years ago by the Swedish scientist J. A. Brinell and continued by S. P. Rockwell who invented the Rockwell tester in 1921. Many of his observations were based upon more than 30 years of experience in dealing with virtually all of the known hardness testing techniques.

Today, stated Mr. Lysaght, the commonly used testing machines for determining resistance to permanent indentation are the Brinell, Rockwell, Rockwell superficial, the 136° diamond pyramid and the scleroscope. Their use, along with portable hardness testers, was discussed and described through a well-arranged series of informative slides.

Special production applications and the testing of thin sheet metals and cylindrical parts with the Rockwell and Brinell units were covered in considerable detail. The conversion of hardness scales, and it is often desirable to convert from one hardness scale to another, was touched upon. However, due to many diverse factors, conversion should be used with discretion. Such factors as modulus of elasticity and the work-hardening capacity of the metal under test, have been found to contribute materially to hardness relationships.

The importance of proper supports, particularly for irregular shapes, sheet metal, small items and round pieces was stressed. It is a fundamental requirement when conducting such tests that the surface under observation be approximately normal to the tester's penetrator and that the piece be held firmly in place as the testing load is applied.

Microhardness testing, through utilization of Wilson's Tukon tester received considerable attention. This instrument employs low loads and affords accurate measurement of the indentation in restricted areas in carbide tool tips, watch springs, drill rods, instrument pivots, surgical needles and tiny pellets of pen points. Microhardness testers, it was pointed out, are ideal for measuring the hardness of plated surfaces and bimetallic thermocouple surfaces.—**Reported by A. C. Ross for British Columbia Chapter.**

New Haven Features Rockets

Members of the **New Haven Chapter** heard a talk entitled "Rockets and Space Ships—Their Development and Their Metallurgical Problems" by Wolfgang Steurer, head of materials research, Army Ballistic Missile Agency, Redstone Arsenal, at a recent meeting. The meeting attracted the largest attendance the chapter has had this season and the speaker was so effective that even the waiters at this dinner meeting listened to him instead of rattling the dishes.—**Reported by J. L. Baker for New Haven.**

Describes "Exotic" Metals At Chattanooga Meeting

Speaker: Leonard Scribner
Fansteel Metallurgical Corp.

Members of the **Chattanooga Chapter** heard a talk on "Columbium, Tantalum, Molybdenum and Tungsten, Their Production and Their Applications" by Leonard Scribner, assistant general manager, Metals and Fabrication Division, Fansteel Metallurgical Corp.

This group of metals, known as high-temperature or exotic metals, contains those with the highest melting points (tungsten, 5400° F.) of the metals used in high-temperature work. The speaker described the extraction of these metals by his company, using slides showing an outline of the steps used. Tungsten and molybdenum are extracted by treatment with caustic to break down the ore followed by reduction with hydrogen while columbium and tantalum are separated by fractional crystallization after caustic break up of the ore. From the fractions tantalum is separated by electrolysis and columbium by chemical separations. Chemically, all these metals are attacked by alkalies and all are acid resistant, with tantalum being the most resistant to acids. Physically, tantalum is the most ductile with tungsten having little ductility at low temperatures. On heating, columbium and tantalum have the most resistance to scaling while molybdenum scales badly. This high rate of scaling has prevented the use of molybdenum in high-temperature applications.

Dr. Scribner showed commercial uses of the metals with slides picturing typical products. These include X-ray targets in various shapes made from tungsten, electronic tube cups drawn from molybdenum and capacitors (of which some 15,000 are needed for a large missile), made from tantalum. Tantalum can be welded in inert gas, but so far, molybdenum and tungsten have not been welded. Asked about the cost of these metals, Dr. Scribner gave these prices as typical: Tantalum—$58 lb. in plate; columbium—$55 lb. in powder form; and tungsten and molybdenum around $3.50 lb. in powder form.—**Reported by J. H. McMinn for Chattanooga.**

Hear Talk on Metallizing

The "Metallizing Night" meeting of the **Edmonton Chapter,** sponsored by the Wall Colmonoy Co., featured a talk by Elmer Lell on "Metallizing". About 100 people attended the meeting. A display unit showing the metallizing process in all phases was set up for inspection and served as an illustration for Mr. Lell's discussion.—**Reported by A. H. Mohr for Edmonton Chapter.**

Speaks on Molybdenum in Los Angeles

Alvin J. Herzig, Climax Molybdenum Co. of Michigan, Talked on "Molybdenum and Its Promising Alloys" in Los Angeles. Shown are, from left: John Wilson, chairman; National Secretary W. H. Eisenman; and Mr. Herzig

Speaker: A. J. Herzig
Climax Molybdenum Co. of Michigan

At a joint meeting of the **Los Angeles Chapter** A.S.M. and the local chapter of the American Society for Testing Materials, Alvin J. Herzig, president of the Climax Molybdenum Co. of Michigan, spoke on the subject "Molybdenum and Its Promising Alloys". Mr. Herzig's lecture, originally presented at the 60th annual meeting of the A.S.T.M., received the H. W. Gillett Memorial Award.

Mr. Herzig described the critical need for better high-temperature materials. It would be helpful if the metal state could be extended, for admittedly, many of the requirements are above the metal useful range. Powdered metallurgy is making it possible to produce some of these higher temperature materials.

Mr. Herzig described in detail a new melting process in which molybdenum aggregate is compressed and sintered continuously, forming a continuous electrode which is fed into a melting chamber. Within the melting chamber the electrode melts under controlled atmosphere and solidifies in water-cooled copper molds to form 1000-lb. ingots.

Special guests at this meeting included Donald Clark, past president and W. H. Eisenman, national secretary, A.S.M., and Richard T. Kropf, president and Robert J. Painter, national secretary, A.S.T.M.—**Reported by W. F. Paetz for Los Angeles.**

Savannah River Exhibits Reactor

Destined for the World's Fair in Belgium, a Model Reactor Was Displayed in Augusta, Ga., Citizens & Southern Bank as the Savannah River Chapter's Exhibit Contribution to National Engineers' Week, W. L. Worth (left), chairman, and B. L. Owens, exhibit chairman, explain the reactor's operation to bank official J. B. Jones. (Reported by W. L. Worth)

Gives Grossmann Lecture at Mahoning

Shown Looking Over the Grossmann Memorial Plaque Awarded Annually by the Mahoning Valley Chapter Are, From Left: Russell T. Wiandt, Chairman; Howard W. Jones, President, Youngstown University; and E. J. P. Fisher, Youngstown University, Who Received the Award and Gave the Lecture

Speaker: E. J. P. Fisher
Youngstown University

We are closer to true understanding of metals because of the work of men like Grossmann, Henry Bessemer, and all the other scientists in metallurgy, according to E. J. P. Fisher of the Youngstown University Engineering School, who presented the annual Marcus A. Grossmann Memorial Lecture before the **Mahoning Valley Chapter.**

Grossmann, a native of Youngstown, Ohio, and a national president A.S.M., rose to fame in metallurgy through his treatise on "Heat Treatment and Hardenability of Steel".

In reviewing the history of the iron and steel industry in Europe, England and the United States, Prof. Fisher pointed out the significant contributions of metallurgists and the dovetailing of one discovery into another. Through this chronology, Prof. Fisher led to his main thesis "The Second Half Century After Bessemer".

There are two half centuries to consider in relation to Bessemer; the second half century after his invention (1907-1957), and the second half century after his death (1948-1998).

In summarizing, Prof. Fisher remarked that the future holds the promise of better metals and the better use of metals for a better world.

Prof. Fisher, a past chairman of the Chapter, was introduced by Howard Jones, president of Youngstown University. Karl Fetters, Youngstown Sheet and Tube Co., and vice-chairman of the Chapter, presented the Grossmann Memorial Award to Prof. Fisher.—**Reported by A. R. Roth for Mahoning Valley.**

Columbia Chapter Receives Charter

The Columbia (South Carolina) Chapter, Organized in February 1957, Recently Held Its Charter Night Meeting. The Chapter now has a total of 42 members. Shown at the presentation of the Charter are, from left: Frank Cox, secretary; Cliff Selby, Savannah River Chapter member; Royce G. Waites, vice-chairman; G. E. Daniels, chairman; W. Leslie Worth, chairman of the Savannah River Chapter. (Reported by James L. Evans)

C. L. WEST, vice-president of the Electric Furnace Co., Salem, Ohio, has been named chairman of the Board of Directors, to fill the vacancy left by the death of F. TROY COPE, SR. F. TROY COPE, JR., will become vice-president in charge of sales.

ROBERT O. OFFILL has been appointed advisory engineer with Lindberg Industrial Corp., Chicago, to coordinate sales activities of the company's custom-built field-erected equipment. He was sales manager of the Industrial Heating Division of Westinghouse Electric Corp.

PHIL CLARKE, formerly in steel sales with Youngstown Sheet and Tube Co., is now manager of hot roll steel products for Lone Star Steel Co., in Dallas.

CHARLES L. THOMPSON has been appointed sales manager for Magnesium Co. of America to assist in the company's growth program of light metals fabrication and material handling equipment.

FRANK A. GUBA has retired as manager of the Alloy Tube Division of Carpenter Steel Co. He plans to continue in the field of stainless steels as a consultant and manufacturer's representative.

ERWIN E. HIRSCHBERG, Eastern territorial manager, is now sales manager of the Industrial Combustion Division, Eclipse Fuel Engineering Co., Rockford, Ill.

C. M. CAPKA, formerly with Eclipse Fuel Co., has been appointed general sales manager of Despatch Oven Co., Minneapolis.

CHARLES R. INCE, a vice-president of St. Joseph Lead Co., has been elected to the company's Board of Trustees.

OLIVER E. SHIPP, has become affiliated with Sam Tour & Co. Inc., and the American Standards Testing Bureau Inc., with headquarters in Newburgh, N. Y., in order to make his help on research, development and investigative problems readily available to clients in Eastern New York, Northern New Jersey, Connecticut and Massachusetts.

Baltimore Briefed on AEC's Fast Reactor Program

Speaker: G. W. Wensch

Atomic Energy Commission

Glen W. Wensch, Civilian Power Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission, presented a talk on "AEC's Fast Reactor Program" at a meeting held in **Baltimore.**

Advances in many fields of technology are largely dependent upon the capability of the metallurgical industry to produce metals and alloys to meet new and demanding physical and mechanical requirements. For example, fast reactors utilize liquid metals as coolants since these materials have the necessary high thermal efficiencies and have little effect on the neutron energies. The use of liquid metal coolants, however, results in some difficult problems in handling and containment.

The advantages of fast reactors are: breeding is possible, thereby extending fission power capabilities and yielding many hundreds of years of extra energy reserves; reactor cores are compact with high power densities; a greater choice of structural materials is available; fission-product poisons do not decrease reactivity; and a low excess reactivity is required for operation. Hence, there are good reasons for this type reactor. In fact, the United Kingdom has announced that after 1980 all of their electric power construction will be of the fast reactor type.

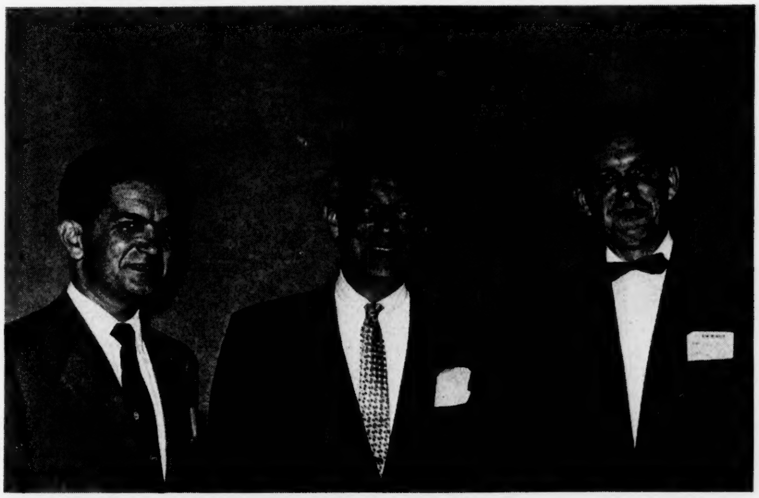
Dr. Wensch discussed the nature of present-type reactors including Argonne National Laboratory's EBR I and II, Los Alamos Scientific Laboratory's LAMPRE, and the Power Reactor Development Co.'s Enrico Fermi fast breeder reactor. He also discussed the critical assemblies ZPR-III and ZPR-V, fast reactors of essentially zero power and with a high degree of flexibility of core assemblies. With these facilities extensive investigations of both a theoretical and applied nature have been conducted, including the Doppler investigation and the experiments for the EBR-I, Mark III core and the EBR-II core. The Commission, through its laboratories, is constantly encouraging the development of advanced reactor design concepts and research.

The Fast Reactor Safety Program has been steadily growing since its organization, with studies ranging from basic physics to reactor containment tests. An important part of the safety program designed to lead to a better understanding of the fuel melt-down problem is the development of the transient reactor experimental test. This facility will supply a high-neutron flux capable of melting fuel pins or clusters of pins in a simulated excursion.

It has long been recognized by reactor specialists that plutonium is particularly attractive as a fast reactor fuel since it is a product of breeding and produces more useful neutrons in the chain reactor when the neutron energies causing fission are high. Investigations during the past six months at the AEC's Mound Laboratory have been aimed at providing data necessary for designing plutonium-fueled nuclear reactors.

Dr. Wensch concluded by stressing the dependence of the success of the AEC's many projects upon the continuing advances in the various fields of metallurgy. The laboratories and American industry can be justly proud of the advancement that has been made.—**Reported by E. C. Beatty for Baltimore.**

Describes Metals in Electron Devices



Walter Kohl, Stanford University, Presented a Talk on "Metals in Electron Devices" at a Meeting of Santa Clara Valley. Shown are, from left: S. Duran, Stanford; Dr. Kohl; and P. Slocum, program chairman

Speaker: Walter H. Kohl

Stanford University

Walter H. Kohl, research associate and lecturer at the Electronics Laboratory, Stanford University, and consultant on materials and techniques, spoke at a meeting of the **Santa Clara Valley Chapter** on "Metals in Electron Devices".

The speaker reviewed the importance of metals in the electronic industry and gave examples of the amounts used by the Bell Telephone System. Even the precious metals, gold and platinum, find widespread applications in the electronic industry; the dollar value of gold consumed annually for this purpose is $45,000,000. Apart from its high resistance to atmospheric corrosion and its high electrical conductivity, gold has the added advantage of not growing whiskers; for this reason circuit components are being gold-plated to an ever-increasing extent.

The unique metallurgical properties of whiskers owing to their freedom from dislocations were briefly discussed and examples given of the high values for tensile strength which were observed on whiskers of iron, zinc, copper, silver and silicon. A further exploration and controlled development on a larger scale of such structures as are encountered in whiskers of microscopic size offer a challenge to the metallurgist. The refined techniques used in the production of solid-state devices, such as transistors, should also result in a considerable modification of the metallurgist's approach to new problems. It was mentioned that the dollar value of transistors sold in 1957 for military and civilian use amounted to approximately $85,000,000.

Dr. Kohl then discussed special alloys used for indirectly heated cathodes in receiving tubes, alloys for glass-to-metal seals, brazing alloys for joining metals to themselves and to ceramics, gas permeation through metals when they are used as envelopes for tubes which operate at high temperatures, and corrosion protection in the same application.

Stanford Research Institute has conducted an extensive survey for the U. S. Air Force on the construction and operation of electron tubes in environments where high temperature (500° C.), high shock and vibration levels and nuclear radiation are encountered. The final report of this study is now available from the U. S. Department of Commerce, Office of Technical Services, by reference to W. H. Kohl and P. J. Rice, "Electron Tubes for Critical environments", (Contract AF 33(616)-3460) Final Report, July 1957, (WADC TR 57-434) by Stanford Research Institute for Wright Air Development Center, Wright-Patterson Air Force Base, Ohio. Dr. Kohl presented some highlights from his work on this contract.—**Reported by James H. Anderson for Santa Clara Valley.**

Explains Cold Heading Process

"Cold Heading of Metals" Was the Topic of a Talk in Rockford by Richard Wagner, Gary Screw and Bolt Division, Pittsburgh Screw and Bolt Co. From left are: Mr. Wagner, J. F. Sisti, D. A. Campbell, and Glen Sandstrom

Speaker: Richard Wagner
Gary Screw and Bolt Division
Pittsburgh Screw and Bolt Co.

Members of the **Rockford Chapter** heard a talk on "Cold Heading of Metals" by Richard Wagner, assistant superintendent, Gary Screw and Bolt Division, Pittsburgh Screw and Bolt Co. Mr. Wagner supplemented his talk with slides depicting the types of equipment used in the heading industry.

The Industrial Fastener Institute has defined cold heading as consisting of forcing metal to flow into dies to form thicker sections and more or less intricate shapes.

Cold heading was developed for the production of bolts, screws and rivets, and is applicable to a wide variety of special parts that have somewhat similar forms. Because of the high forming pressures necessary and the heavy machinery involved, cold heading is applied only to comparatively small and medium-size parts, generally to those that can be produced from wire no larger than 1 in. in diameter and finished lengths up to 6 in.

Mr. Wagner described a cold header as a mechanical press which has a horizontal slide. It has attached feed rolls, a shearing and transfer mechanism, and a built-in ejection system composed of a kicker and a knock-out pin.

The basic types of cold headers are the solid die, which uses a cylindrical die, and the open die, which uses two dies, each having a square cross section. Both types are being built to use one, two or more heading punches and, accordingly, are called single, double and triple stroke, or multiple-station headers. In the open die machine, the heading die is made in the form of two half dies, which open up to allow the wire to pass through as it is pushed in by the feed rolls against the stock gage. The action of the machine then presses together and locks the two half dies and, at the same time, cuts off the wire. Next the upset is formed and, at the same time, it prepares the stocks for the second and finishing blow.

In the solid die, the die is made in one piece, cylindrical in shape, with a hole through its axis. The wire is fed into the machine by the feed rolls against a stop, the cut-off knife shears off the blank and positions it in front of the heading die. The blank is then pushed into the heading die by the upset hammer, which also forms the upset. The heading hammer strikes the upset and forms the desired shape of head.

One of the reasons cold heading is making greater strides today is because of the better quality of raw material we have to work with. Mr. Wagner reviewed the quality of hot rolled steel, starting with inspection of physical and chemical properties of the steel from billets to the final wire made ready for heading. Cold heading advantages offer high material savings, and the ease of holding close tolerances. Also, the cold heading method helps insure the use of sound high-quality metal and increases the strength of the product by cold working.

Cold heading, in general, is a high-speed process with a scope far greater than generally realized for producing a tremendous volume and variety of products at a minimum cost.—**Reported by G. W. Sandstrom for Rockford Chapter.**

Predicts Future of Materials Research

Speaker: J. H. Hollomon
General Electric Co.

"The Future of Materials Research" was discussed by John H. Hollomon, manager, Metallurgy and Ceramics Research Department, General Electric Research Laboratory, at a meeting of **Golden Gate Chapter.**

Dr. Hollomon talked about the history of metallurgy from the standpoint of chemical refining, where the emphasis was placed on inorganic chemistry and methods of production control. In the last 20 years the science of metallurgy has been applied to newer phases. More recently metallurgists have been concerned with the arrangement of atoms, rather than with grains or crystals.

The development of the Bessemer and openhearth steelmaking processes, the electrolytic aluminum refining process, and the Kroll magnesium and titanium processes have carried us to our present level of chemical technology. Of these methods, the rapid growth of development of the titanium process was due primarily to government interest and backing. It was predicted that processing methods for zirconium and ductile chromium will soon be added to this group.

Plans to extend the performance of turbojet aircraft from the present Mach 1 range to the range of Mach 3 depend upon the extension upwards of strength at temperature limits of skin and bucket materials. One evidence of solution to these problems may be in the control of the melting stage of refining of metals that are already in use and whose properties are well known to industry. Vacuum melting, consumable electrode arc melting and zone melting techniques must be completely developed and must be used to further purify these metals by the elimination of undesirable inclusions and gases.

The study of microstructure has been a key tool in the development of the theory concerning brittle fracture of single and polycrystalline structures. By controlling microstructure the propagation of a crack can be controlled and the mode of failure may be predicted. This method can be used in the improvement of the toughness of ceramic materials. The control of microstructure is also important in the manufacture of permanent magnets and the manufacture of steel sheet for electromagnetic core laminations.

The control of atoms and how they are joined will be of future interest to metallurgists. High-strength levels at high temperatures may be realized if materials free of defects can be produced. Cited as examples were unusually high-strength levels of metal whiskers deposited from the vapor phase.—**Reported by F. R. Sullivan for Golden Gate.**

Richmond Filled in on Space Satellite Details

Speaker: J. A. Burke, Jr.
Experiment Inc.

"Earth Satellites" was the topic of a talk given at **Richmond Chapter** by Jerry A. Burke, Jr., executive vice-president, Experiment Inc.

Mr. Burke, who is vice-chairman of the Richmond Chapter, emphasized the importance of satellites as research tools as well as for military purposes. Properly instrumented satellites will extend man's eye above the atmosphere so that we can have a new look at our own earth and our first really close look at other bodies in our solar system and much further out in space.

Information sent back from the Explorer already has added to our knowledge of the region which surrounds the earth several hundred miles up. Missions of this satellite and others to follow are to gather data on cosmic and ultraviolet rays, magnetic fields, temperature and meteors. In addition to supplementing man's basic knowledge of his environment, these data should help man improve such things as radio and television reception and long-range weather forecasting. Around-the-world television and control of the weather may result.

The rocket which launched the Explorer was compared with those which launched the Russian Sputniks. When compared on the basis of the thrust necessary to put the Explorer into orbit, it was indicated that the Russians had a very large rocket for putting the half-ton Sputnik II into orbit. The fuel used by the Russians was probably the same as ours, but their launching techniques were probably different from those used by the United States, permitting them to have a better thrust to total weight ratio.

Staging techniques and fuels were then discussed by Mr. Burke. Staging was described as a method of combining rockets into one unit so that the thrusts of the individual rockets could be used to greatest advantage. For example, the second stage can be fired just as the first stage burns out to obtain maximum velocity for the remainder of the rocket. Various types of liquid and solid fuels for the different stages were discussed. Various combinations of liquid and solid fuels have been used in Vanguard (Navy) and Jupiter "C" (Army) rockets.

Slides were shown of artists' drawings of many advanced-design space vehicles, including a space laboratory in the shape of a wheel 200 ft. in diameter circling the earth at speeds of greater than 10,000 mph. To put such a large vehicle in space in one piece would be impractical because of the high thrust required. It would have to be shipped up in sections and assembled in space.

The large number of orbits possible with satellites or space vehicles were classified into three main types: those which permit a satellite to fall back to earth in less than one complete revolution; those which permit it to continue indefinitely in orbit around the earth; and those which permit it to escape the gravitational pull of the earth and proceed to further reaches of space. Escape orbits could take the vehicle to the moon, to other planets in our solar system, or to other bodies in and out of our own galaxy. Greater distances of travel would depend upon the development of better propulsion systems. Even with advanced propulsion systems, several generations of crews would be necessary in order for man to travel to many points in known space. **—Reported by W. W. Berkey for Richmond Chapter.**

Cites Railroad Uses of Atomic Power

Shown at a Meeting of the Santa Clara Valley Chapter Are, From Left: R. W. Parcel, Dalmo Victor Co.; Ray McBrian, Denver & Rio Grande Railroad, Who Spoke on "Applications of Atomic Energy to American Railroads"; and H. T. Sumsion, Lockheed Aircraft Corp., Chapter Secretary

Speaker: R. McBrian
D. & R.G.W. Railroad

"Applications of Atomic Energy to American Railroads" was the subject of a talk by Ray McBrian, director of research, D. & R.G.W. Railroad at a meeting which was held by the **Santa Clara Valley Chapter.**

Mr. McBrian discussed the applications of nuclear power, tracer techniques and irradiation effects to problems of the modern railroad.

A gaseous reactor having size and power suitable for land transportation usage has been proved theoretically practical, and a pilot unit will be built in the next two years. Its simplicity permits adequate shielding within the weight limits of a standard locomotive and the design will incorporate adequate safeguards in the event of mishaps, including wrecks.

Mr. McBrain also described or exhibited many economical applications of radioactive materials, such as maintenance-free signal lights with a half-life of ten years. He revealed experimental results on the irradiation of coal dust to reduce its particle size below one-tenth micron, thereby permitting use of coal additives to fuel oil.

Also described at some length was the electron-microscope rating of fuel oils, which has saved the Rio Grande Railroad about one-half million dollars annually. The road buys fuel oil on the basis of price alone, examines samples for particle size of colloidal materials such as sulphides, treats the oil to reduce these particles to below 0.1 micron, and thereby obtains a fuel of quality equal to that selling for highest prices.

Tracer techniques are being used to study hot boxes, rail failures and lubrication failures. Irradiation studies for preservation of perishable foods are showing significant success.

Mr. McBrian showed how a study initially aimed at nuclear power had expanded into myriad atomic techniques, some of which have already saved more than the anticipated total cost of all the programs.**—Reported by R. W. Parcel for Santa Clara Valley Chapter.**

Texas Topic Is Hardening of Steels

Morris Cohen, Massachusetts Institute of Technology, Presented a Talk on "Hardening of Steel" at a Meeting Held Recently by the Texas Chapter. Shown are, from left: W. D. Gilder, secretary-treasurer; Curtis L. Horn, chairman; Dr. Cohen; and Joe B. Marx, vice-chairman of the chapter

Speaker: Morris Cohen
Massachusetts Institute of Technology

Morris Cohen, Massachusetts Institute of Technology, spoke on "Hardening of Steel" at a meeting of **Texas.**

Dr. Cohen introduced his talk with a description of the field of metallurgy. He then presented a description of the hardening character of steel and how it is achieved and controlled. He explained the iron-carbon phase diagram and the normal structures of austenite at elevated temperatures and of ferrite and cementite at ambient temperatures. He then described the formation of martensite and explained with time-temperature-transformation curves how martensite is created and how carbon and alloying elements affect the ability to create martensite at different cooling rates.

In general, an increase in carbon increases the ease with which martensite is formed. The hardness which steel achieves on being cooled from the austenitic state at elevated temperatures is a function of the amount of martensite which is formed. In some cases austenite will be retained at room temperatures. As carbon increases the tendency for austenite retention increases. Delays in the cooling process can stabilize austenite and it cannot be transformed completely.

Dr. Cohen summarized that hardening depends on the forming of martensite and that hardenability is the ease with which martensite can be produced.

Tempering is the process of heating a hardened steel to improve ductility and toughness. Phase changes occur because, as temperature increases, the unstable martensite decomposes to a more stable combination of ferrite plus cementite.

When steel is rapidly cooled and martensite is formed it expands. Because steel does not cool uniformly the martensite transformation throughout a piece of steel does not begin at the same time. This results in distortions and residual stresses. Tempering can relieve residual stresses. Strength decreases and ductility increases with tempering. For a given end hardness, a lower initial hardness means a lower tempering temperature and leaves more residual stresses.

Dr. Cohen discussed the effects of carbon content on the physical properties of steel. He described the embrittlement which takes place in normal alloy steels when tempered at about 500° F. At this temperature a valley occurs in the impact curve. This is the temperature at which cementite begins to precipitate from the martensite. The addition of silicon retards the rate of cementite formation and can thus relieve the problem. Addition of 1½% silicon shifts the brittle characteristic to approximately 800° F. Where physical properties in the 500° F. tempering range are desired, silicon can be added. This is the basis for certain high-strength steels.

A question and answer session brought the technical session to a close.

As a part of the educational program of the Chapter, invited guests were the high-school teachers and science supervisors of Houston. Thirty-three teachers attended and each was given a copy of the A.S.M. book "Metals Technology". In addition to the teachers there was a season-high turnout of 145 members and guests.—**Reported by M. C. Lucky for Texas Chapter.**

Night Out for Carolinas Ladies

Shown Are the Wives and Guests of Members of the Carolinas Chapter Who Attended the Ladies Night Meeting Held Recently. Beth Tartan, fourth from right, presented the coffee talk. (Reported by Paul A. Stalder)

Past Chairmen Meet in Peoria

Past Chairmen Present at a Recent Meeting Held by the Peoria Chapter Included, Back Row, From Left: W. E. Short, T. M. Logan, C. A. Davis, Jr., J. G. Weiss, J. W. Cantwell, R. H. Van Pelt and D. J. Wright. In the front row, from left: A. L. LaMasters, W. L. Naumann, J. W. Bridwell, G. Thiersch, J. R. Sloan and E. R. Meyer. (Report by O. Philips)

New Films

Forging in Closed Dies

A 27½ min. sound motion picture in full color, produced by the Drop Forging Association, explains each kind of forging process, the design and making of dies, the variety of metals used and their selection. It shows today's almost infinite variety of forged products and describes the properties imparted to the metal by the forging process. Available through Modern Talking Picture Service, Inc., 3 E. 54th St., New York 22, N. Y.

More Than Just Steel

"More Than Just Steel", produced by Armco Steel Corp., tells the story of special-purpose sheet steels, from electrical steel and enameling iron in the early years of the century to special zinc-coated and aluminum-coated steels of today. It covers standard and special stainless steels, their developments and interesting uses. The film runs 30 min., is 16-mm. and has sound. Write Product Information Service, Armco Steel Corp., Middletown, Ohio, or any local distribution office of Modern Talking Picture Service, Inc.

Forming for Uniformity

A film produced by the Alloy Tube Division of Carpenter Steel Co., Union, N. J., which covers the manufacturing process in the production of uniform welded stainless tubing and pipe. The film also illustrates quality control methods and inspection procedures. It is available through the Sales Promotion Department.

Street Lighting

Street lighting, from Colonial times to present-day advances achieved through the use of aluminum lighting standards, is presented in a color movie available from the film library of Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa. The 16-mm., 20-min. motion picture features many scenes taken in Philadelphia and highlights the value and effects of god lighting in achieving safety, crime prevention and beautification of cities. The production of lighting standards is pictured from the extrusion process to final tapering, wrapping and erection.

Frequency Response

The Instrument Society of America, 313 Sixth Ave., Pittsburgh 22, Pa., has produced a 37-min. film which explains in nonmathematical terms the elements of frequency response, a tool for the quantitative dynamic analysis of instruments and process systems. The film also describes frequency response analysis as applied to a liquid-level system.

Speaks on Irradiation Effects

Spencer Bush, General Electric Co.'s Hanford Laboratories, Spoke on the "Effects of Irradiation on Structural Materials" at Puget Sound. Shown are, from left: C. R. Jackson, D. G. Berryman, Dr. Bush, and E. E. Bauer

Speaker: Spencer Bush

Hanford Laboratories
General Electric Co.

At a recent meeting of the **Puget Sound Chapter,** Spencer Bush, supervisor of fuel fabrication operations, General Electric Co., Hanford Laboratories, spoke on "Effects of Irradiation on Structural Material and Fuels".

Dr. Bush classified the materials of a reactor into two groups—fissionable material for reactor fuel, and nonfissionable material for structural applications. In discussing the fissionable metals, the speaker limited his remarks to uranium. He pointed out a few of the physical properties that were affected by irradiation.

Several factors govern the selection of nonfissionable structural material for reactor construction, including corrosion, fabrication, cost, irradiation effects, nuclear properties, availability of material, physical properties, mechanical properties, and purpose of the reactor.

Radiation damage in metals occurs as the result of neutron bombardment. Damage occurs when a neutron strikes the nucleus and is absorbed. The change in physical properties of metals produced by radiation damage is significant. Increases in hardness and yield strength were explained. Dr. Bush also pointed out the importance of hydrogen in lowering the impact energy of irradiated metals such as Zircaloy-2. He showed several slides to illustrate these effects.

The speaker supplemented his talk by showing slides of impact data and optical and electron microscope photographs. — **Reported by J. E. Kamitchis for Puget Sound Chapter.**

Minnesota Hears Talk on What's New in Heat Treating

Speaker: D. R. Edgerton

Lindberg Steel Treating Co.

"What's New in Heat Treating" was the subject of a talk given by D. R. Edgerton, Lindberg Steel Treating Co., at a meeting of the **Minnesota Chapter.** Mr. Edgerton covered the practical side of heat treatment, clearly illustrating his talk with appropriate slides.

The speaker explained that the manufacture, fabrication and heat treatment of steel have improved considerably in recent years. However, he stressed the importance of co-operation between the metal supplier, fabricator and heat treater so that the end result be completely satisfactory. Everybody agrees that it isn't much fun to conduct post-mortems to determine why a part isn't still in one piece or as straight as it should be.

Probably the No. 1 question regarding heat treating is "how much will it distort or change in size?" Unfortunately, there is no one who can accurately answer that question under all circumstances.

Mr. Edgerton mentioned one method of predicting size changes which is presently being used on unusual dies or parts. The process consists of giving the part a normal heat treatment in the rough machined state and measuring distortion and size change. Then the part is annealed and finish machined, with allowances made using the assumption that the part will change in the same direction just half as much in the final hardening operation.

Mr. Edgerton also discussed the latest heat treating furnaces and associated equipment, and special processes such as malcomizing, sulphurizing, etc.—**Reported by P. B. Wallace for Minnesota.**

M. E. I. Reaches New High in Enrollments

Eva Harasztia, M.E.I. Staff Member, Demonstrates a Collating Machine Which Speeds by Ten Times Assembly of Lessons, Tests and Reports. Glen C. Boyce, first M.E.I. student, looks on. Miss Harasztia is a native of Budapest, and has been in this country 1½ years

Two distinguished students of the Metals Engineering Institute visited the "campus" late in May and viewed operations in the office of the fast-growing home study and in-plant training institute that now has 710 students.

Glen C. Boyce, chemist and metallurgist of the Iowa Malleable Iron Co., Fairfield, Iowa, who is the Institute's very first student, was in Cleveland where he received his certificate marking completion of the course "Elements of Metallurgy". He has enrolled in another M.E.I. course, "Ferrous Metallurgy".

"The 'Elements of Metallurgy' course was so well keyed to my present work that additional study is very much in order as far as I am concerned", said Boyce, the father of two children and a foreman in his company.

Also visiting Cleveland in late May was Alphonso Penagos, general manager of the Penagos, Hermanos, Ltd., Bucaramanga, Colombia, S.A. A mining engineer, Penagos was the first student enrolled in the "Gray Iron Foundry" course offered by M.E.I. His company, a foundry, is an old family concern. He is one of 15 pupils from seven foreign countries enrolled in M.E.I.

Student enrollment in the Institute topped the 700 mark during the past month, with featured showings of the 18 courses now available being made at the Metal Powder Show in Philadelphia, at the Southwestern Metal Exposition in Dallas, and at the Foundry Show in Cleveland. Interest in the courses has grown rapidly with the following now available:

Elements of Metallurgy
Heat Treatment of Steel
High-Temperature Metals
Titanium
Steel Plant Processes
Metals for Nuclear Power
Stainless Steels
Electroplating and Metal Finishing
Primary and Secondary Recovery of Lead and Zinc
Steel Foundry Practice
Gray Iron Foundry Practice
Oxy-Acetylene Process
Blast Furnace Operations
Fundamentals of Ferrous Metallurgy
Toolsteels
Magnesium
Copper, Brass and Bronze
Arc Welding

Information and complete details may be obtained from A.S.M.'s Metals Engineering Institute, 7301 Euclid Ave., Cleveland 3,—or with the convenient coupon on p. 58.

Home Study Helps Meet Challenge to Education

Last year over 750,000 people enrolled in private home study schools according to figures recently released by the National Home Study Council, Washington, D. C. Twenty thousand of these were in engineering and engineering technology, including metallurgy. Over 200,000 more were in mechanical and electronics courses. Since many of the courses require over a year to complete, the active student body in private home study schools at any one time is well over a million.

Statistics in home study have not been gathered long enough to plot trends, but indications are that each year the proportion of technicians and professionals in the student body increases. The reason for this lies in our rapidly changing technology and in the increasing need for continuing education throughout life.

Even highly trained men cannot keep up today without continuing education in their field. Professional magazines help, and so do short-term institutes, but, for serious, systematic, extended study, particularly in new areas, well-organized courses are needed. Once through high school or college, the average person cannot take the time to return to resident school for extended periods, and home study becomes the answer.

Actually, home study schools can often keep in the forefront of professional development much better than can the average resident school. This is because they have the resources which can be geared to keep instruction immediately up-to-date.

When plastics was in its infancy, a professional plastics course was available from a home study school six years before the first resident course. In electronics today, resident schools complain that hardbound texts are obsolete before they reach the market. Home study schools are in the unique position of being able to revise literally over night.

Home study schools, offering metallurgy, for example, have instructional materials in loose-leaf or in pamphlet form, so that new developments may be inserted immediately, without going through the lengthy and expensive process of a complete textbook reprinting. Complete revisions and reprintings are made at frequent intervals, and print runs are kept small for this reason. Revision files are maintained on a perpetual basis, and cover both content changes and improvements from a teaching standpoint.

Good home study materials also have a magazine's virtues of professional writing and editing. At the same time they have the important virtue of good school texts, in being systematically organized for learning. They have a further advantage that both the magazine and school texts generally lack: they are tested on live students and revised frequently for maximum teaching effectiveness. In addition, as in a classroom, instructors can adapt or supplement materials as needed to assure actual learning on the part of each student.

A.S.M.'s newest division, the Metals Engineering Institute, provides up-to-the-minute courses on many branches of the metal industry. Every metallurgist, metallurgical technician, every metal man, is cordially invited to inquire at A.S.M. headquarters to learn how M.E.I. can be of service to him. No obligation, of course.

The 13th Metallographic Exhibit

Cleveland, Ohio, October 27 to 31, 1958

All metallographers—
everywhere—
are cordially invited to
display their best work.

RULES FOR ENTRANTS

Exhibitors do not need to be members of the American Society for Metals.

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable.

Photographic prints should be mounted on stiff cardboard, extending no more than 3 in. beyond edge of print in any direction; maximum dimensions 14 by 18 in. (35 by 45 cm.). Heavy, solid frames are unacceptable.

Entries should carry a label on the *face of the mount* giving:

Classification of entry.
Material, etchant, magnification.
Any special information as desired.

The name, company affiliation and postal address of the exhibitor should be placed on the *back of the mount* together with a request for return of the exhibit if so desired.

Entrants living outside the United States should send their micros by first-class letter mail endorsed "Photo for Exhibition—May be Opened for Customs Inspection".

Exhibits must be delivered before Oct. 15, 1958, either by prepaid express, registered parcel post or first-class letter mail, addressed:

Metallographic Exhibit
American Society for Metals
7301 Euclid Ave.
Cleveland 3, Ohio, U.S.A.

CLASSIFICATION OF MICROS

Class 1. Cast irons and steels.
Class 2. Carbon and alloy steels (wrought).
Class 3. Stainless steels and heat resisting alloys.
Class 4. Aluminum, magnesium, beryllium, titanium and their alloys.
Class 5. Copper, nickel, zinc, lead and their alloys.
Class 6. Uranium, plutonium, thorium, zirconium and reactor fuel and control elements.
Class 7. Metals and alloys not otherwise classified.
Class 8. Series showing transitions or changes during processing.
Class 9. Welds and other joining methods.
Class 10. Surface coatings and surface phenomena.
Class 11. Slags, inclusions, refractories, cermets and aggregates.
Class 12. Electron micrographs.
Class 13. Results by unconventional techniques.
Class 14. Color prints in any of the above classes. (No transparencies accepted.)

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which in the opinion of the judges closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $500 from the Adolph I. Buehler Endowment will also be awarded the exhibitor whose work is judged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's national headquarters in Cleveland.

All prize-winning photographs will be retained by the Society for one year and placed in a traveling exhibit to the various ASM Chapters.

40th NATIONAL METAL CONGRESS & EXPOSITION

CLEVELAND PUBLIC AUDITORIUM — — — OCTOBER 27 THRU 31, 1958

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared at the Center for Documentation and Communication Research, Western Reserve University, Cleveland, With the Cooperation of the John Crerar Library, Chicago.

A General Metallurgy

245-A. Dust Elimination in Metal Working. A. E. Williams. *Metal Industry,* v. 92, Feb. 14, 1958, p. 130-132.

(To be continued.) (A8a)

246-A. Dust Elimination in Metal Working. A. E. Williams. *Metal Industry,* v. 92, Feb. 21, 1958, p. 147-149.

(Conclusion.) (A8a)

247-A. Effluent Problems. Pt. 3. Plant Layout and Construction. *Metal Industry,* v. 92, Feb. 21, 1958, p. 153-155.

(A8b; 18-67)

248-A. Copper in 1957. Paul E. Grainger. *Metal Industry,* v. 92, Feb. 28, 1958, p. 176.

A survey of world production and consumption. (A4p; Cu)

249-A. Spodumene — Major Source of Lithium. James S. Browning. *U. S. Bureau of Mines Information Circular* 7824, Feb. 1958, 20 p.

111 ref. (A11a, B14, B15, B16; Li)

250-A. Progress in Titanium Research. Matthew A. Hunter. *Washington Academy of Sciences, Journal,* v. 48, Jan. 1958, p. 1-7.

(A9; Ti)

251-A. Removing Dust From Brown Converter Waste Gases. Willi Dehne. *Stahl und Eisen,* v. 77, no. 9, 1957, p. 553-562. (Iron and Steel Institute, Translation no. 543.)

Previously abstracted from original. See item 272-A, 1957. (A8a, D3)

252-A. Dust Removal in a Strand Sintering Plant. Bernhardt Weilandt. *Stahl und Eisen,* v. 77, Aug. 8, 1957, p. 1064-1069. (Iron and Steel Institute, Translation no. 665.)

Previously abstracted from original. See item 404-A, 1957. (A8a, B16; Fe, RM-n)

253-A. Dust Removal in a Pellet Sintering Plant. Rudolf Nase. *Stahl und Eisen,* v. 77, Aug. 8, 1957, p. 1070-1074. (Iron and Steel Institute, Translation no. 737.)

Previously abstracted from original. See item 405-A, 1957. (A8a, B16b, 1-2; Fe, RM-n)

254-A. (German.) **Wetting Agents for the Precipitation of Dust Such as Fine-Grained Iron Oxides in Steel Mill Smoke.** Robert Meldau. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 615-621.

20 ref. (A8a; ST)

255-A. (Russian.) **40 Years Growth of Ural Foundry Industry.** A. A. Gorshkov. *Liteinoe Proizvodstvo,* Jan. 1958, p. 28-32.

20 ref. (A2, E-general)

256-A. Industry in the World Today. *Light Metals,* v. 21, Apr. 1958, p. 114-115.

A new development in the U. S. aluminum industry is the direct supply of molten metal from the Al reduction works to an adjacent foundry of the big automobile manufacturers. (A5b; Al)

257-A. Design Characteristics of Titanium. Leland W. Long. *Machine Design,* v. 30, Feb. 6, 1958, p. 137-140.

(A-general, 17-51; Ti)

258-A. These Steels Have What the Users Want. *Steel,* v. 142, Feb. 17, 1958, p. 126-130.

Properties, applications and composition of U. S. Steel Corp.'s T-1 steel.
(A-general, Q-general; 17-57, ST)

259-A. (French.) **Radioactive Ores: Uranium and Thorium.** *Metallurgie et la Construction Mécanique,* v. 90, Feb. 1958, p. 79-85.

(A-general, P18; U, Th, RM-n)

260-A. (French.) **Spanish Aluminum Industry.** G. A. Baudart. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 41-44.

History of 30 years of Spanish Al industry and expansion plans of two main producers, Endasa (1100 tons capacity) and Aluminio Espanol (5000 tons). (A5, A2; Al)

261-A. (German.) **Determining Factors in Melting Costs.** A. Hohman. *Giesserei-Praxis,* v. 76, Mar. 1958, p. 81-83.

(A4s, E-general)

262-A. (Portuguese.) **On the Exportation of Manganese From Minas Gerais.** Iphygenio Soares Coehlo. *Engenharia, Mineracao e Metalurgia,* v. 26, Sept. 1957, p. 139-140.

Depletion of Mn ore reserves; proposal for gradual stoppage of exports. (A11a; Mn)

263-A. (Portuguese.) **Expansion of the Steel Industry in Sao Paulo.** Roberto Jafet. *Engenharia, Mineracao e Metalurgia,* v. 26, Sept. 1957, p. 143-150.
(A4; ST)

The subject coding at the end of the annotations refers to the revised edition of the ASM-SLA Metallurgical Literature Classification. The revision is currently being completed by the A.S.M. Committee on Literature Classification, and will be published in full within the next few months.

264-A. (Russian.) **Organization of Repair Work in Steel Mills.** G. B. Antsyshkin. *Metallurg,* Feb. 1958, p. 1-2.

(A5b, 18-72; ST)

265-A. Thorium and Rare Earth Metals. Their Properties and Applications. *Genie Civil,* v. 135, Mar. 1958, p. 108-112.

(A-general, Q-general, 17-57; Th, EG-g)

266-A. Computers Move Into Planning: Mathematical Analysis Proves Out in Tests. *Iron Age,* v. 181, Apr. 24, 1958, p. 90-91.

(A9n, X14; 18-74)

267-A.* The Dollars and Sense of Pickle-Liquor Treatment. James S. Joseph and E. T. Culver. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 112-122.

Disposal method for spent pickle liquor by either neutralization or regeneration; cost factors. Method adopted depends primarily upon volume of liquor to be disposed of. (A8b, L12g)

268-A. Current Trends in Metal Science and Future Developments in Aluminum Metallurgy. George J. Mills. *Light Metal Age,* v. 16, Apr. 1958, p. 11-14.

(A9; Al)

269-A. A 'New Look' for the Light Metal Beryllium: Atomic, Electronics and Missile Industries Brighten Its Future. *Light Metal Age,* v. 16, Apr. 1958, p. 17-18.

(A-general, 17-57; Be)

270-A.* Cupro-Nickels Offer Corrosion Resistance and Hot Strength. J. L. Everhart. *Materials in Design Engineering,* v. 47, May 1958, p. 114-120.

Comprehensive report on properties, fabrication and applications of 70-30, 80-20 and 90-20 Cu-Ni alloys. (A-general, P-general, Q-general; 17-57; Ni, *Cu*)

271-A.* Potential and Future of Molybdenum and Its Alloys. Alvin J. Herzig. Paper from "The Metal Molybdenum", American Society for Metals, p. 4-9.

Ingot weight increased 50 to 100-fold; section size of wrought products 25 to 50-fold; substantial improvements in uniformity and ductility of wrought products. Alloys have been produced having 100-hr. life in creep-rupture tests at 2000° F. under a stress of 50,000 psi.; improvements in the art of fabricating and forming complex shapes from stock of heavy section.
(A-general; Mo)

272-A.* Molybdenum Metal Powder. C. H. Toensing. Paper from "The Metal Molybdenum", American Society for Metals, p. 31-50.

Molybdic oxide from ores, physical properties of Mo compounds-molyb-

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

denum trioxide (MoO_3), molybdenum dioxide (MoO_2), ammonium molybdate ($(NH_4)_2MoO_4$; hydrogen reduction; properties of Mo metal powder. 30 ref.
(A11a, P-general; Mo, 6-68, 14-59)

273-A.* **Development and Properties of Arc-Cast Molybdenum-Base Alloys.** M. Semchyshen. Paper from "The Metal Molybdenum", American Society for Metals, p. 281-329.

Study of castings concerned principally with determination of the solid solubility and nature of the first excess phase developed in molybdenum-rich alloys; effects of alloying elements on deoxidation of Mo and on grain size and microstructure of the castings; alloy systems which are amenable to heat treatment (precipitation hardening) for control of mechanical properties; effects of alloying elements on hardness and hot working characteristics of the castings. 9 ref.
(A-general, C5h; Mo-b)

274-A.* **Molybdenum Research and Development in Great Britain.** L. Northcott. Paper from "The Metal Molybdenum", American Society for Metals, p. 519-529.

Notes on purity, working, properties, welding, constitution, oxidation resistant coatings, Mo coatings. 6 ref. (A-general, A9; Mo)

275-A. (Dutch.) **Metallurgy.** R. J. Forbes. *Metalen,* v. 13, Mar. 31, 1958, p. 111-114.

Iron and steel in the Middle Ages. 6 ref. (To be continued.)
(A2; Fe, ST)

276-A. (French.) **Pamiers Plants of Societe Metallurgique d'Imphy.** *Metallurgie et Construction Mécanique,* v. 90, Mar. 1958, p. 171-175.
(A-general, W10; ST)

277-A. (German.) **Basic Considerations on Laying Out Continuous Automatic Machine Lines.** H. Goebel. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 145-152.
(A5, 18-74)

278-A. (Hungarian.) **History of Metal Casting From Origin Until Introduction of Cast Iron.** Zsak Viktor. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 12-21.
6 ref. (A2, E-general; Cu-s)

279-A. (Hungarian.) **Manufacture and Properties of Uranium.** Hantos Rezsö. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 27-33.
10 ref. (A-general; U)

280-A. (Russian.) **Perspectives for Development of Thomas Steel Production in the USSR.** V. M. Tsitver. *Stal',* Feb. 1958, p. 164-168.

Available raw materials make possible annual output of 10-12 million tons of steel by this method.
(A4p, D3, 1-65; ST)

281-A. (Book.) **ASME Handbook—Metals Engineering—Processes.** Roger W. Bolz, Ed. 448 p. 1958. McGraw-Hill Book Co., Inc. 330 W. 42nd St., New York 36, N. Y. $13.50.

Final volume of the ASME Handbook; covers processing of metals into finished products; heat treatment, casting, hot and cold working, powder metallurgy, welding, machining and electroforming. (A-general)

282-A. (Book.) **The Metal Molybdenum.** Julius J. Harwood, Ed. 696 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $12.50.

Properties, fabrication, metallurgy and applications of molybdenum alloys; 23 papers abstracted separately. (A-general; Mo)

283-A. (Book.) **Minerals Yearbook, 1954, Vol 1.** 1419 p. 1958. Government Printing Office, Washington 25, D. C. $4.50.
(A4; 14-59)

B Ore and Raw Material Preparation

91-B. **Behaviour of Xanthates in Flotation.** C. H. G. Bushell. *Canadian Mining and Metallurgical Bulletin,* v. 51, Mar. 1958, p. 137-149.
10 ref. (B14h)

92-B. **Production of Finest Ore Agglomerates and Their Behavior in the Blast Furnace.** Ludwig von Bogdandy and Rudolf Schmolke. *Stahl und Eisen,* v. 77, May 30, 1957, p. 685-692. (Iron and Steel Institute, Translation no. 648.)

Previously abstracted from original. See item 66-B, 1957.
(B16, D1; Fe)

93-B. **Sinter Cooling: An Essential Element of Modern Plant.** Gunter Brandes and Helmut Wendelborn. *Stahl und Eisen,* v. 77, May 30, 1957, p. 693-700. (Iron and Steel Institute, Translation no. 649.)

Previously abstracted from original. See item 67-B, 1957.
(B16a, 1-2; Fe)

94-B.* (German.) **Methods of Titanium Ore Dressing.** Willy K. Finn. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 471-479.

Survey of Ti ore occurrences, various ore dressing methods such as flotation, gravity separation, electrostatic and magnetic separations, and their applicability for secondary occurrences for titaniferous magnetites and for ilmenite-hematite ores. 3 ref. (B14, A11a; Ti, RM-n)

95-B.* (German.) **Influence of Surface Roughness, Grain Form and Grain Size of Ores Upon the Losses of Burden Material During Flotations.** Gerhard Gerth. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 493-499.

The surface roughness for various ores was determined and the losses of burden materials through adhesion to the ore particles investigated. Losses are high for flat grain, lower for skin-type grains. Surface roughness up to 8μ. resulted in burden material losses of 2.3 g. per ton; from 8 to 10μ. approximately 2.9 g. per ton; at roughness greater than 10μ. approximately 4 g. per ton. Forster surface roughness tester described. 3 ref. (B14h, S15, RM-n)

96-B. **Flotation: The Art of Utilizing Modifying Agents.** Samuel P. Moyer. *Mining Magazine,* v. 98, Jan. 1958, p. 9-16.

Review of tools available to mineral-dressing engineer. (B14h)

97-B. **Mineral Dressing Processes in Review. Pt. 2.** E. J. Pryor. *Mining Magazine,* v. 98, Jan. 1958, p. 22-27.
(B14h, C19; 14-59)

98-B. **Pb-Zn-Cu: How Flotation's Most Difficult Separation Is Being Done.** Frank W. McQuiston. *Mining World,* v. 20, Feb. 1958, p. 49-52.
(B14h; Cu, Pb, Zn)

99-B. **Holly Minerals' New Three-Step Process for Impure Mercury Ores.** Ernest Oberbillig, James Fyfe, William Aitkenhead and John Jaekel. *Mining World,* v. 20, Feb. 1958, p. 53-56.

New method for treating "impure" Hg ores consisting of crushing, grinding and flotation concentration; leaching concentrates with sodium sulphide; electrolytic precipitation of Hg from the alkaline sulphide solution. 6 ref.
(B13, B14h, C19n, C23p; Hg)

100-B.* (French.) **Use of the S. K. Porosimeter for Measuring the Porosity of Refractories.** J. Baron. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 161, Mar. 1957, 7 p.

Principles of use, some results obtained with iron ore sinters and various refractory materials, with total porosity broken down into closed porosity, microporosity, average porosity, and macroporosity. Results compared with those obtained by conventional methods. 12 ref. (B19d)

101-B. (Russian.) **Nodulizing Finely Pulverized Iron Ores.** G. B. Gubin. *Metallurg,* Feb. 1958, p. 3-4.
(B16c; Fe)

102-B. **Use of Castable Ceramics for High Temperature Fixtures.** Herbert Schwartz. *Industrial Heating,* v. 25, Feb. 1958, p. 362-370.
(B19)

103-B. **Intergranular Comminution by Heating.** J. H. Brown, A. M. Gaudin and C. M. Loeb, Jr. *Mining Engineering,* v. 10, Apr. 1958, p. 490-496.

Tests on granite, syenite, taconite and marble. 13 ref. (B13; Fe, RM-n)

104-B. (Russian.) **Mechanism of Pellet Strengthening on Burning.** A. N. Pokhvisnev and B. A. Savel'ev. *Stal',* Feb. 1958, p. 104-109.

Burning of pellets of magnetite concentrates in atmosphere of increased oxygen content results in complete oxidation at top rate of magnetite grains and their conversion into hematite grains. Pellets should be kept at maximum temperature for completion of recrystallization of hematite grains.
(B16a; Fe)

105-B. (Russian.) **Testing of Unburnt Magnesite-Chromite Bricks for Openhearth Roofs.** B. P. Okhrimovich, A. E. Pribytkov, A. I. Uzberg and P. A. Rumm. *Stal',* Feb. 1958, p. 126-130.

Intensity of wear of unburnt magnesite-chromite bricks is only slightly higher than that of burnt bricks, while the cost is only half as great and the process of production of unburnt bricks is considerably simpler. (B19d, D2; RM-h38)

106-B. (Russian.) **Decarburization of Solid Ferrochrome Under Vacuum.** I. D. Kirichenko. *Stal',* Feb. 1958, p. 131-137.

Decarbonization under vacuum by means of iron ore or by previously oxidized ferrochrome makes possible the production of an inexpensive low-silicon and carbonless ferrochrome containing 0.01-0.3% carbon.
(B-general, 1-73; Cr, AD-n31)

C Extraction and Refining

149-C.* Vacuum Melting and Heat Treating. Pt. 1. Roger Giler. *Industrial Heating,* v. 25, Mar. 1958, p. 480-482, 484, 486, 490, 492, 494, 626.

Vacuum is produced by mercury or oil diffusion pump or a combination of diffusion ejector pumps. Vacuum is measured by McLeod gage, electrical gages, or by electron emission. Various vacuum melting furnaces and newly adopted melting processes. (To be continued.) (C25, D8m, 1-55)

150-C.* Semicontinuous Casting of Beryllium Copper. K. G. Wikle. *Metal Progress,* v. 73, Apr. 1958, p. 85-89.

Billets in large and small size are cast with high yield of sound, fine-grained metal, free from residual beta phase, and at a lower cost per pound than by the conventional Durville process. (C5q; Cu, Be, 4-52)

151-C.* Zone Melting Opens New Horizons in Metallurgy. *Metal Progress,* v. 73, Apr. 1958, p. 97-102.

Zone melting is fast developing into an important method for metal purification. It also has other uses in research, development and manufacturing. For example, it can distribute an impurity uniformly throughout a single crystal—a problem long unsolved. (C28k)

152-C.* Electron Beam Purifies Alloys. *Steel,* v. 142, Mar. 24, 1958, p. 108-109.

High melting point metals (Ge, Ti, Zr, Ta, Mb, Co) purified by electron beam melting under high vacuum. (C28, 4-73; Ge, Ti, Zr, Ta, Mb, Co)

153-C. (German.) **Significance of Electrochemistry in the Production of Metals.** Gunther Hansel. *Bergakademie,* v. 9, Oct. 1957, p. 499-512.

31 ref. (C23, L17)

154-C. (German.) **Present State of Technical Aluminum Electrolysis and Future Trends in Development.** H. Ginsberg. *Metall,* v. 12, Mar. 1958, p. 173-175.

Furnaces for current strength up to 100,000 amp. and above are mostly used. Anodes were developed in single large blocks up to 2000 kg. Progress in development of rectifiers; decrease of current density below 0.6 amp. per sq. cm. is unfavorable; further increase of current strength is possible. (C23; Al)

155-C.* (German.) **Present Day Continuous Casting of Aluminum.** E. Hermann. *Metall,* v. 12, Mar. 1958, p. 193-197.

Equipment for continuous casting. In Germany vertical casting is mostly used. Possible defects caused by remaining gases. Unified casting-rolling process. (C5q, 1-52; Al)

156-C.* Leaching of Manganese From Pyrolusite Ore by Pyrite. G. Thomas and B. J. P. Whalley. *Canadian Journal of Chemical Engineering,* v. 36, Feb. 1958, p. 37-43.

By heating an aerated slurry of ore and pyrite and recycling the leach liquor at controlled acidity to attack fresh ore, a manganous sulphate solution free of iron was obtained which, when heated to about 175° C., yielded manganous sulphate monohydrate. During the leaching process, iron in the liquor was alternately oxidized by the pyrolusite and reduced by the pyrite. In an alternative leaching procedure, the heating of an aqueous slurry of pyrite in an autoclave first under oxygen pressure and then in the absence of oxygen produced an acidic ferrous sulphate solution suitable for the subsequent leaching of pyrolusite ore at ambient temperatures. 11 ref. (C19n; Mn)

157-C. Dawn's Uranium Plant Features Acid Extraction and Column IX. Don Hargrove. *Mining World,* v. 20, Feb. 1958, p. 34-41.

Process of split agitation, acid extrusion of uranium from the ore, use of column ion exchange circuit. (C19; U)

158-C.* (Italian.) **Production of Electrolytic Cadmium From Zinc Smelter Byproducts by Means of Amalgam Metallurgy.** G. Binetti and A. Vaschetti. *Metallurgia Italiana,* v. 50, Jan. 1958, p. 1-7.

Process giving 99.95% pure Cd consists of three stages: leaching of cadmiferous materials with sulphuric acid; treating of leaching liquor with Zn amalgam and recovery of a Cd amalgam; electrolysis in rotating disk cells, where Cd amalgam acts as an anode, with part of its Cd content going into solution and being deposited on cathode. 14 ref. (C29, C23p, A11c; Cd, Zn)

159-C. The Hydrometallurgy of Refractory Canadian Uranium and Columbium Minerals. A. D. Pittuck, C. A. Freitag and T. V. Lord. *Canadian Mining and Metallurgical Bulletin,* v. 51, Apr. 1958, p. 228-232. (C19n; Cf, U; RM-n)

160-C.* Arc Melting Molybdenum. George A. Timmons and Robert G. Yingling. Paper from "The Metal Molybdenum", American Society for Metals, p. 80-108.

Pressing-sintering-melting machine is capable of converting 1000 lb. of Mo powder to a cast ingot 9 in. diameter by approximately 45 in. long at the rate of 10 lb. per min. The charge is automatically compacted into a consumable electrode which is sintered by resistance heating to increase its strength and then arc melted in a water-cooled copper mold, all three operations occurring simultaneously and successively in a single vacuum system. (C5h, 1-73; Mo)

161-C.* Sintered and Arc-Melted Molybdenum Alloys. R. Kieffer and E. Pipitz. Paper from "The Metal Molybdenum", American Society for Metals, p. 530-552.

Competition between arc melting and sintering has reached an equal level, since the latter has advanced to the 100 to 300-kg. category. Sintered alloys are normally more formable than the more coarse-grained melted alloys. The latter may be rolled and swaged by using high operating temperatures (over 2900° F.) and grain-refining additives. 31 ref. (C5h, H-general, Q23q; Mo)

162-C. (Hungarian.) **Vacuum Sublimation Process for Metallic Lead.** Mecsenov Petr. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 10-14.

Vacuum smelting is the most effective method for reduction of lead sulphide ores. Yield of Pb is 99%, that of Zn is 90%. Concentrated condensate may be used for lead casting. 5 ref. (C25; Pb, Zn)

D Iron and Steelmaking

152-D. Gas Turbines for Blast-Furnace Blowing. G. H. Krapf and J. O. Stephens. *American Society of Mechanical Engineers,* Paper no. 58-GTP-14, Mar. 1958, 11 p.

(D1b, W11m, 1-52)

153-D. Novel Oxygen Plant Serves New Steelmaking Process at Jones & Laughlin. *Industrial Heating,* v. 25, Apr. 1958, p. 748-750.

(D10, W10; ST, *O*)

154-D.* R-N Process for Direct Reduction of Iron Ores. *Metal Progress,* v. 73, Apr. 1958, p. 73-77.

Process economically produces iron concentrates which are suitable as feed for blast furnaces, cupolas, openhearths and electric furnaces. Use for treating low-grade ore or with high-grade ore to produce metallics. Full-sized plants designed; combination of an R-N plant with electric furnaces would in many cases be cheaper to operate and involve less investment than a blast furnace-openhearth combination. (D8j, D5g, D1h; Fe, RM-n)

155-D. Vacuum-Melted Steel, Titanium and Zirconium. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 74-76.

(D8m, C25; ST, Ti, Zr)

156-D. Gas Atomizes Openhearth Fuel. V. B. Thompson. *Steel,* v. 142, Apr. 14, 1958, p. 144-147.

Natural gas under high pressure is used to atomize fuel oil as it is injected into the furnace combustion chamber. (D2g, W18r; RM-k)

157-D. Noise Measurements for Control and Conduction of the Blow in the Bessemer Process. Pt. 1-2. J. Klarding. *Metall,* v. 9, Sept. 1955, p. 780-793; v. 10, May 1956, p. 405-415. (Iron and Steel Institute, Translation no. 622.)

Previously abstracted from original. See item 344-D, 1955. (D3; ST)

158-D. Supervision and Control of the Basic Bessemer Process by Evaluation of Temperature Radiation of the Bath and the Spectrum of the Converter Flame. Franz Wever. *Stahl und Eisen,* v. 75, May 5, 1955, p. 549-559. (Iron and Steel Institute, Translation no. 788.)

Previously abstracted from original. See item 212-D, 1955. (D3)

159-D. (French.) **Large Arc Furnaces Used in Steelmaking.** M. Petitdidier. *Journal du Four Electrique,* v. 63, Jan-Feb. 1958, p. 19-26.

32 ref. (D5, W18s)

160-D.* (German.) **Investigation on the Speed of Separation of Primary Deoxidation Products From Iron Heats.** Wilhelm Anton Fischer and Manfred Wahlster. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 601-609.

The velocity of segregation of primary deoxidation products in mild steel heats was investigated in middle-frequency crucible furnaces after the addition of silicon. Si and oxygen contents were determined every 2 min. The velocity of segregation is dependent on percentage of Si added, furnace temperature; size of furnace; furnace linings; presence or lack of stirring motion. 19 ref. (D11r; ST, 9-69)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

161-D.* (German.) **Newest Developments in the Field of Fe-Cr Metallurgy.** G. Volkert. *Metall,* v. 11, Oct. 1957, p. 846-848.

Various processes were developed to obtain ferrochromium as alloying component for steel. For high carbon content (1-10% C) a low-shaft furnace is used, coal being the reduction agent. Low MgO content of the ore is desirable to prevent sticky slags. For low carbon content a 3-stage method is employed using three electric furnaces and high-silicon Cr ores. 5 ref.
(D5, D8n, AY, *Cr,* AD-n)

162-D. Studies of the Permeability of Blast-Furnace Burden Materials. J. M. Ridgion. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 317-320.

Relationship between pressure drop and air flow in beds of broken solids. Various discrepancies are noted with special reference to the peculiarities of layered systems of different sizes, and it is concluded that quantitative predictions of the behavior of beds of solids are not reliable. 5 ref. (D1a)

163-D. Investigation of Stresses on Units of the Continuous Casting Installations for Steel. V. F. Shchukin. *Stal',* no. 4, 1957, p. 320-321. (Iron and Steel Institute, Translation no. 536.)

Previously abstracted from original. See item 232-D, 1957.
(D9q, 1-52; ST)

164-D. Properties of O.H. Steel Processed With Oxygen. D. S. Kazarnovskii. *Stal',* no. 2, 1957, p. 152-157. (Iron and Steel Institute, Translation no. 539.)

Previously abstracted from original. See item 336-D, 1957.
(D2g; Q-general; ST-e)

165-D. Continuously Cast Products for Rolling Mill and Forge. Joseph Hofmaier. *Stahl und Eisen,* v. 77, Jan. 24, 1957, p. 69-78. (Iron and Steel Institute, Translation no. 572.)

Previously abstracted from original. See item 83-D, 1957.
(D9q; ST, 4-52)

166-D. Improvement of the Quality of Ingots With Ultrasound. N. P. Nikolaichik and E. N. Nikolaichik. *Stal',* no. 4, 1957, p. 322-325. (Iron and Steel Institute, Translation no. 598.)

Previously abstracted from original. See item 224-D, 1957.
(D9, 1-74; ST)

167-D. Results of New Studies Made With O.H. Furnaces and Particularly With Those of the Maertz Type. Reinhold Baake and Harry Stollberg. *Neue Hütte,* v. 2, Feb-Mar. 1957, p. 157-168. (Iron and Steel Institute, Translation no. 616.)

Previously abstracted from original. See item 207-D, 1957.

168-D. Use of Oxygen in Refining Pig Iron. Walter Bading. *Stahl und Eisen,* v. 77, July 11, 1957, p. 926-931. (Iron and Steel Institute, Translation no. 620.)

Previously abstracted from original. See item 207-D, 1957.
(D10, D1h, D2g, D3f; ST)

169-D. Detonation and Shock Wave. (Report 301 of the Blast-Furnace Committee of V.D.E.) Michael Hansen. *Stahl und Eisen,* v. 77, June 13, 1957, p. 805-813. (Iron and Steel Institute, Translation no. 636.)

Previously abstracted from original. See item 187-D, 1957. (D11j, D1)

170-D. Dephosphorization of Basic Converter Steel to Very Low Contents of Phosphorus. Hans Kosmider and Hermann Schenck. *Stahl und Eisen,* v. 77, July 11, 1957, p. 917-926. (Iron and Steel Institute, Translation no. 637.)

Previously abstracted from original. See item 208-D, 1957.
(D3d, D11n; ST, RM-g)

171-D. Use of a Low-Carbon Cast Iron Prepared in the Hot-Blast Cupola as an Openhearth Charge. R. Boutigny and C. Barbazanges. *Circulation Information Tech.,* no. 1, 1955, p. 169-192. (Iron and Steel Institute, Translation no. 650.)

Previously abstracted from original. See item 131-D, 1955.
(D2, E10, C1)

172-D. Chemical Equilibria in the Basic Bessemer Converter. Alfred Decker. *Archiv für das Eisenhüttenwesen,* v. 28, Feb. 1957, p 57-64. (Iron and Steel Institute, Translation no. 654.)

Previously abstracted from original. See item 139-D, 1957.
(D3, D11s; ST)

173-D. Smelting of Ferromanganese in Large Blast Furnaces. A. F. Zakharov. *Stal',* no. 7, 1957, p. 580-584. (Iron and Steel Institute, Translation no. 670.)

Previously abstracted from original. See item 339-D, 1957.
(D1; Fe, Mn, AD-n)

174-D. Smelting of Fluxed Sinter Made From Krivoi Rog Iron Ores. I. V. Raspopov. *Stal',* v. 17, Feb. 1957, p. 99. (Iron and Steel Institute, Translation no. 681.)

Previously abstracted from original. See item 334-D, 1957.
(D1a, B16a; Fe, RM-n)

175-D. Experiences and New Findings in Refining of Basic Bessemer Pig Iron by Blowing With Pure Oxygen. Friedrich Springorum. *Stahl und Eisen,* v. 77, Sept. 19, 1957, p. 1284-1296. (Iron and Steel Institute, Translation no. 710.)

Previously abstracted from original. See item 344-D, 1957. (D3f; ST)

176-D. Trends in the Refining of Phosphorus-Rich Iron With Oxygen. Heinrich Rellermeyer. *Stahl und Eisen,* v. 77, Sept. 19, 1957 p. 1296-1303. (Iron and Steel Institute, Translation no. 711.)

Previously abstracted from original. See item 345-D, 1957.
(D10a; ST)

177-D. Automation in the Iron and Steel Industry. Reinhold Perlick. *Neue Hütte,* v. 2, Feb-Mar. 1957, p. 92-102. (Iron and Steel Institute, Translation no. 724.)

Previously abstracted from original. See item 183-D, 1957.
(D-general; F23, 18-74)

178-D. Hot Blast Cupola Furnace in Openhearth Practice. Albert-Friedrich Oberhofer. *Stahl und Eisen,* v. 77, May 16, 1957, p. 643-651. (Iron and Steel Institute, Translation no. 727.)

Previously abstracted from original. See item 180-D, 1957. (D2; 1-52)

179-D. Mechanism of Top Blowing. Rudolph Hammer. *Stahl und Eisen,* v. 77, Sept. 19, 1957, p. 1303-1308. (Iron and Steel Institute, Translation no. 733.)

Previously abstracted from original. See item 346-D, 1957.
(D10a; ST)

180-D. Hydrodynamics of (Proof of Convection in) Liquid Steel in Ingot Molds. A. A. Zborovskii. *Stal',* no. 1, 1957, p. 24-30. (Iron and Steel Institute, Translation no. 787.)

Previously abstracted from original. See item 330-D, 1957.
(D9k, 1-54; ST)

181-D.* (French.) **Electrical Smelting of Iron Ore.** K. Sandvold, F. C. Collin and J. Gunderson. *Chimie et Industrie,* v. 79, Feb. 1958, p. 144-149.

Development of electric furnace process in Norway and elsewhere. Importance of raw material preparation (concentration, sintering, preheating) for modern electric furnace operation. Possibilities of future competition between these and coke-fired blast furnaces. 7 ref.
(D8n; Fe)

182-D.* (French.) **New Method of Improving Blowability in Thomas Converters.** B. Trentini, P. Vayssiere, D. Jorre and M. Gombert. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 168, June 1957, 12 p.

Process permits insufflation of very diverse types of powdered materials under standard operating conditions of Thomas converter. At beginning of refining process, limited amount of powdered lime is injected into charge. Almost instantaneous action of this powder reaching place where oxygen of the blast reacts on bath prevents foaming of primary slag and thus improves blowability during critical blast period. Lime injection must be closely controlled. Silicon content of pig can exceed 1.5%; initial charge can be greater; time saving results; there is practically no increase in nitrogen content of steel. 5 ref. (D3b, 1-65; ST)

183-D.* (French.) **Conference on Energy (Metz, June 6, 1957).** *Revue de Metallurgie,* v. 55, Feb. 1958, p. 179-185.

Summary of eight papers on energy problems arising in blast furnaces and basic bessemer steel plants. Coke economy, large and small blast furnaces, preheating of the blast, energy balance in iron works; heat balance in basic bessemer conversion, in melting of scrap, energy consumption in basic bessemer plant; recovery of heat from flame of basic bessemer converter. (D1, D3b, 1-65, A11e; ST)

184-D.* (French.) **Hydrodynamic Study of Bath Movements in Bottom-Blown Converters. Pt. 2.** P. Leroy and G. Cohen de Lara. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 186-200.

Geometrical and pneumatic factors influencing blowability. 7 ref.
(D3b)

185-D. (Russian.) **Increasing the Productivity of Blast Furnaces.** *Metallurg,* Jan. 1958, p. 1-2.
(D1)

186-D. (Russian.) **Casting With Liquid Pig Iron.** P. V. Gubchevskii. *Metallurg,* Jan. 1958, p. 3-5.
(D1c)

187-D. (Russian.) **Effect of Refractory Materials on Contamination of Ball Bearing Steel.** M. I. Vinograd, M. A. Lyubinskaya and N. D. Orekhov. *Metallurg,* Feb. 1958, p. 12-15.

Tests with fireclay, kaolin and high-alumina oxide used for refractory lining show that fireclay gives highest nonmetallic inclusions.
(D2; ST, SGA-c, RM-h35, 9-69)

188-D. (Russian.) **Deoxidation of Rail Steel With Aluminum.** N. I. Shirokov and B. G Petukhov. *Metallurg,* Jan. 1958, p. 17-21.
(D9r, D11r; ST, *Al*)

189-D. (Russian.) **Overloading Steel Smelting Electric Arc Furnaces.** E. I. Astrov. *Metallurg,* Jan. 1958, p. 21-22.

How to get the maximum produc-

(*)**Articles Available Through Photocopy Service; See Coupon, p. 59.**

tion out of 15 and 20-year old electric arc furnaces by establishing the correct relation between capacity of transformers and dimensions of furnace. (D5a)

190-D. (Russian.) **Performance of Openhearth Furnaces With High Calorie, Low Pressure Gas.** V. S. Kocho, V. I. Grankovskii, Yu. D. Molchanov and E. A. Ploshchenko. *Metallurg,* Feb. 1958, p. 9-12.

Reduction by one-half of low-calorie coke gas while retaining same volume of fuel oil and blast furnace gases increases the theoretical temperature and augments productivity of furnace. (D2h, W18r; RM-m)

191-D. Electric Furnace Steel Manufacturing. W. E. Lewis. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 98-102.

Electric furnace equipment and capabilities in Western U. S. Cost estimates. (D5, 1-52, 17-53; ST)

192-D. Ferrocoke and Its Use in the Blast Furnace. D. S. Kashchenko and S. A. Sazonov. *Koks I Khimiya,* no. 6, June 1956, p. 21-26. (Henry Brutcher, Altadena, Calif., Translation no. 4007.)

(D1b; Rm-j43)

193-D. Study of Conditions of Heat Exchange and Reduction (in Blast Furnaces) Working on Fluxed Sinter. N. N. Babarykin and F. A. Yushin. *Stal',* v. 17, no. 1, 1957, p. 7-15. (Henry Brutcher, Altadena, Calif., Translation no. 4066.)

Previously abstracted from original. See item 327-D, 1958. (D1a; Fe, RM-q)

194-D. Influence of Catalysts on the Reduction of Iron Ores With Hydrogen. W. Machu and S. Y. Ezz. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, 1957, p. 367-371. (Henry Brutcher, Altadena, Calif., Translation no. 4067.)

Previously abstracted from original. See item 290-D, 1957. (D8j, Fe, NM-c)

195-D. Fundamental Considerations About the Production of High-Grade Killed Steel. H. Schenck. *Stahl und Eisen,* v. 77, no. 21, 1957, p. 1442-1450. (Henry Brutcher, Altadena, Calif., Translation no. 4079.)

Previously abstracted from original. See item 23-D, 1958. (D2, D11n, ST-d)

196-D. New Deoxidizing and Desulphurizing Practice for Improved Steel Quality. V. A. Skachko and N. P. Merenkov. *Stal',* v. 17, no. 6, 1957, p. 521-522. (Henry Brutcher, Altadena, Calif., Translation no. 4080.)

Previously abstracted from original. See item 300-D, 1957. (D9r, ST, *Al*)

197-D. Sources of Oxide Inclusions in Steel During Tapping and Pouring. E. N. Malinovskii and A. N. Morozov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 8, Aug. 1957, p. 102-108. (Henry Brutcher, Altadena, Calif., Translation no. 4081.)

(D9p, 9-69, 14-68)

198-D.* (English.) **The Importance of Vacuum Casting in the Steel Industry.** F. Kinsky and Z. Kletecka. *Czechoslovak Heavy Industry,* no. 2, 057, p. 3-21.

Effect of hydrogen content on properties of steel, experimental results obtained in vacuum casting of steel ingots including effects of dendritic structure, grain size, oxide inclusions, occurrence and character of segregations, hydrogen content and resultant mechanical properties. 7 ref. (D8m; ST, 9-69)

199-D.* (French.) **Gasification With Oxygen-Enriched Blast Air.** R. Alleyrac, L. de Saint Martin, R. Veuve and P. Leroy. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 173, Sept. 1957.

Use of oxygen-enriched air for the blast furnace. A gain in the lower calorific value of the dry and purified gas of 350 k.-cal. per sq. m. is obtained in using 29% oxygen-enriched air in place of ordinary air. Furnace performance is likewise improved; a 15.5% gain in tons per hr. produced is obtained with the enriched as compared with the normal air. Also a gain in coal consumption. In general, production cost tends to decrease. (D1h)

200-D. (German.) **Operational Results Obtained When Blowing Basic Converter Heats by the IRSID Opacimeter.** Hans von Ende and Gustav Mahn. *Stahl und Eisen,* v. 78, Apr. 3, 1958, p. 412-416.

4 ref. (D3b, 1-65, 1-54; ST)

201-D. (Hungarian.) **Metallurgical and Economic Effect of Steam Injection on the Blast-Furnace Operation.** Farkas Otto. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 1-6.

(To be continued.) (D1h)

202-D. (Hungarian.) **Different Methods for Preventing Pipe in Steel Ingots.** Csabalik Gyula. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 20-23.

5 ref. (D9k, 9-67; ST)

203-D.* (Russian.) **Use of Oxygen in Small Converters.** B. A. Andreyev. *Liteinoe Proizvodstvo,* Mar. 1958, p. 4-7.

Experimental melting with oxygen blast. Three stages of process: deoxidation of melt; alloying of cast iron in ladle; provision of suitable composition of starting metal. Optimal conditions of process. (D3f, D9r; ST)

204-D. (Russian.) **Processes in the Blast Furnace at Top Gas and High-Pressure Operation.** B. F. Goncharov. *Stal',* Feb. 1958, p. 97-104.

Increase of top gas pressure, when using a burden containing 75-85% fluxed sinter, is accompanied by a considerable acceleration of the reduction processes of iron oxides in zones above level of tuyeres. 9 ref. (D1h)

205-D. (Russian.) **Automatic Control of Gas Distribution in the Blast Furnace.** I. A. Suchkov and V. V. Burtsev. *Stal',* Feb. 1958, p. 110-113.

5 ref. (D1f, 18-74)

206-D. (Russian.) **Four-Period System of the Complex Automatic Control for a Fuel-Oil-Fired Openhearth Furnace.** V. P. Borodin, P. E. Darmanian, A. A. Yudson and A. V. Vasil'ev. *Stal',* Feb. 1958, p. 114-120.

Replacement of two-period system by the four-period system brings performance of control system closer to optimum level of furnace. (D2h, RM-k30 18-74)

207-D. (Russian.) **Development of Melting and Pouring Technology for High-Chromium-Nickel-Molybdenum Steel.** V. I. D'iachkov, P. V. Umrikhim, S. G. Slesarev and I. G. Fadeev. *Stal',* Feb. 1958, p. 120-126.

A sharp reduction of rejected billets and finished products has been achieved by alloying of the boiling bath with ferrochrome and pouring of steel by use of frames. 8 ref. (D9p, D9r; SS, AD-n31)

208-D. (Russian.) **Production of Two-Layer Ingots and Slabs.** V. A. Filonov, A. A. Podgorodetskii, F. A. Ksenzuk and V. N. Lola. *Stal',* Feb. 1958, p. 188-191.

(D9)

209-D.* (Swedish.) **Gaseous Mixing in Connection With Combustion in Metallurgical Furnaces.** Erik E. Sjöstrand. *Jernkontorets Annaler,* v. 142, Jan. 1958, p. 15-33.

Critical review of work published in the last 20 years covering gaseous mixtures, openhearth furnaces, port design, gas transit time, gas flow, application of aerodynamics to openhearth development and photographic techniques in combustion research. 20 ref. (D2, D11j)

E Foundry

333-E.* Oxidation and Reduction Reactions in the Cupola. G. Tarocchi. *Foundry Trade Journal,* v. 104, Feb. 27, 1958, p. 231-234.

Changes in composition of gases within the cupola, from oxidizing to reducing conditions. Effect of CO and CO_2 content on reaction temperature and of coke ratio on combustion efficiency. 18 ref. (E10a; CI)

334-E.* Nozzle and Sprue Design for Gooseneck Die Casting Machines. H. K. and L. C. Barton. *Machinery (London),* v. 92, Mar. 28, 1958, p. 727-735.

Causes of nozzle drip, recommendations for nozzle heating, methods of removing broken sprues, developments in sprue design, water cooling arrangements for sprue pins and importance of unrestricted metal flow. Reduction in weight of "dead metal" and the divided sprue are desirable. (E13, 1-52, 17-51)

335-E. Fordath Shell Moulding Developments. *Machinery (London),* v. 92, Mar. 28, 1958, p. 736.

(E19c, E21)

336-E. Design of Die-Castings. Pt. 6. Some Structural Features of Die-Cast Parts. H. K. Barton. *Metal Industry,* v. 92, Feb. 28, 1958, p. 171-174.

(E13, 17-51)

337-E. Control of Die-Casting Machines. *Metal Industry,* v. 92, Mar. 28, 1958, p. 247-251.

(E13, 1-52)

338-E.* (German.) **Casting Properties of Aluminum-Silicon Alloys.** R. Kummerle. *Metall,* v. 11, Oct. 1957, p. 848-854.

Important part of the Si-Al phase diagram up to 25% Si is investigated as to casting properties. The flow properties largely depend upon the behavior at transition from the liquid to the solid state. A spiral-type mold was used for determining the solidification process. For certain sponge-type characteristics two explanations are offered: (1) Al develops dendritic primary crystals, which tend to interlock; (2) the crystallization heat of Si is higher than of Al, slowing down the crystallization process. 18 ref. (E25n, E25p; Al-b, *Si*)

339-E. (German.) **Copper-Lead Alloys. Pt. 3. The Specific Volume of Solid and Liquid Alloys and Volume During Solidification.** E. Pelzel. *Metall,* v. 11, Nov. 1957, p. 954-958.

Various alloys (including Cu-Pb-

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

Ni) are observed as to their behavior during the solidification process. The specific volume varies considerably from liquid to solid depending on the phase diagram; pipe, cavities, porosity and segregation can be explained from these variations and the corresponding expansion and contraction. Materials were investigated with 70 to 85% Pb, 15 to 80% Cu, and 30 to 50% CuNi. 8 ref.
(E25n, P10d; Cu-b, *Pb, Ni*)

340-E. (German.) **Precision Casting as a Method for Producing Small Parts.** Karl August Krekeler. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 35-38.
6 ref. (E15)

341-E. (Russian.) **Mechanization of Shell Molding.** F. I. Smirnov and M. M. Budylin. *Liteinoe Proizvodstvo,* Jan. 1958, p. 3-5.
Casting in shell mold gives greater precision, cleaner surfaces and facilitates the extension of mechanization to all processes.
(E16c, 18-74)

342-E. (Russian.) **Use of Vibration During Crystallization to Eliminate Hot Cracks.** I. I. Novikov, G. A. Korolkov and A. E. Semenov. *Liteinoe Proizvodstvo,* Jan. 1958, p. 7-8.
8 ref. (E25q, 9-22)

343-E. (Russian.) **Use of Artificially Refined Sand for Shell Molds.** V. I. Ivanov and E. P. Tolmachev. *Liteinoe Proizvodstvo,* Jan. 1958, p. 8-10.
(E18, E19c)

344-E. (Russian.) **Properties of Salt Patterns and Their Effects on Surface Quality of Permanent Molds.** F. D. Obolentsev. *Liteinoe Proizvodstvo,* Jan. 1958, p. 16-19.
(E12, E17)

345-E. (Russian.) **Effect of Iron on Properties of Bronze in Bimetallic Products.** E. M. Morozova and N. M. Leibova. *Stanki i Instrument,* Jan. 1958, p. 21-23.
Centrifugal casting, which is most suitable method for bimetallic revolving objects, also results in heightened iron content. However, through proper control of casting procedure, iron content can be kept to less than 1.5%, which would not alter the antifriction properties of bronze. (E14; Cu-s, *Fe*)

346-E. **Low-Temperature Molding.** *Aircraft Production,* v. 20, Feb. 1958, p. 84-86.
Development of steel powder and resin material with stable characteristics for several tooling applications. (E19, T6; ST, 2-63)

347-E. **Evaluation of Bentonites in the Steel Foundry.** Victor E. Zang. *Foundry,* v. 86, May 1958, p. 154-157.
Influence of various properties of western bentonite on molding sand mixes; and tests for measuring these characteristics. (E18n)

348-E. **Shooting Borings Into Cupola Reduces Melting Cost.** R. E. Dixon. *Foundry,* v. 86, May 1958, p. 218-221.
A compressed air device delivers scrap cast iron borings into the cupola melting zone, resulting in savings in scrap and refractory costs and reduced labor requirements. (E10a, RM-p)

349-E. **Oxygen Injection Process Aids Cupola Combustion Control.** John B. La Pota. *Foundry,* v. 86, May 1958, p. 269-276.
Injecting oxygen directly into the cupola through the tuyeres rather than introducing it into the air duct prevents dilution and leakage, permits rapid heating, more precise control of melting process, and gives uniformly good results. (E10a)

350-E. **Foundry Mechanization.** Trevor Kneale. *Iron and Steel,* v. 31, Apr. 1958, p. 125-128.
Large-scale mechanization project at Farington iron and steel foundry of Leyland Motors Ltd. Sand reclamation and mixing plant, filling and ramming of molding boxes, automatic airless shot-blasting plant, and complete reorganization and re-equipment of green sand molding plant. (E-general, W19, 18-74)

351-E.* **Cast Magnesium Airframe Parts.** L. H. McCreery. *Modern Metals,* v. 14, Apr. 1958, p. 66-70.
Precision Mg castings, with tolerances of 1/64 in. or less, draft angles of zero to 1°, and section thickness of 0.100 in. or less, now possible with advanced design methods.
(E-general, T24a, 17-57; Mg)

352-E. **Durability of Ingot Molds at the Kuznetsk Metallurgical Combine.** A. V. Plankina. *Stal',* no. 4, 1957, p. 362-365. (Iron and Steel Institute, Translation no. 534.)
Previously abstracted from original. See item 450-E, 1957. (E19)

353-E. **Feeding Steel Castings Produced by the Lost Wax Process.** M. L. Khenkin. *Liteinoe Proizvodstvo,* no. 5, 1955, p. 1-7. (Iron and Steel Institute, Translation no. 602.)
Previously abstracted from original. See item 240-E, 1955.
(E15, E23, CI)

354-E. **Testing and Evaluation of Binders for Foundry Sands.** Hans Reininger. *Giesserei-Praxis,* v. 75, Apr. 25, 1957, p. 176-181. (Iron and Steel Institute, Translation no. 704.)
Previously abstracted from original. See item 291-E, 1957. (E18n)

355-E. (French.) **Nickel-Copper-Chrominum Castings, Properties and Applications.** G. Henon. *Fonderie,* no. 144, Jan. 1958, p. 3-18.
(E-general, 5-60; Ni, Cr, Cu)

356-E. (French.) **Calculation of Attachment of Feederheads in Sand Casting. The Feederhead Neck.** R. Namur. *Fonderie Belge,* v. 28, Feb. 1958, p. 52-57.
Calculations for feederhead attachments; caloric saturation of sand; delivery, clearance, distance. Design and arrangement of feederheads. 5 ref. (E22n)

357-E. (French.) **Influence of Phosphorus on Quality of Light Alloy Castings.** Louis Grand. *Revue de l'Aluminium,* v. 35, Feb. 1958, p. 171-179.
4 ref. (E11, 9-74; Al-b, Mg-b, *P, Si*)

358-E. (French.) **The Croning Process for Casting Light Alloys.** Fernand Dabel. *Revue de l'Aluminium,* v. 35, Feb. 1958, p. 203-214.
High-precision high-quality method of producing thin, strong cores or molds using very fine sand and synthetic resin. Uses include shell casting, green sand casting, gravity die casting. (E19c, E11, E13; Al, Mg)

359-E. **Investigation of the Refractory Lining, Blast-Feed and Size of Steelworks Hot Blast Cupolas.** Wilhelm Patterson and Albert Oberhofer. *Giesserei,* v. 44, Apr. 25, 1957, p. 227-237. (Iron and Steel Institute, Translation no. 685.)
Previously abstracted from original. See item 217-E, 1957.
(E10a, W18d, 1-52; ST)

360-E. (German.) **Manufacturing Chill Molds for Brass Castings.** H. Kron. *Giesserei-Praxis,* Mar. 1958, p. 87-89.
(E11, 5-66; Cu-n)

361-E. (Japanese.) **Production of Cast Iron With Steel Inserts. Pt. 5.** Taichiro Usui and Yoshio Yamamoto. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 637-643.
Coated inserts are not as effective as bare or polished steel. 4 ref.
(E25, M28, 9-69, 9-71; CI)

362-E. (Russian.) **New Tasks in Furnace Melting.** L. M. Marienbakh. *Liteinoe Proizvodstvo,* Jan. 1958, p. 1-2.
26 ref. (E10, W18)

363-E.* **An Investigation of the Flow of Foundry Alloys With Various Gating Systems Used in Sand Molding.** M. Jeancolas. *British Foundryman,* v. 51, Mar. 1958, p. 119-127.
Indicates that metal at temperatures well above the liquidus acts much like water at normal temperatures, obeying the formulas of hydraulics. 34 ref. (E22p, S18q)

364-E.* **Influence of pH Variation in Foundry Molding-Materials on the Surface Finish of Steel Castings.** D. H. Houseman. *British Foundryman,* v. 51, Mar. 1958, p. 149-155.
Using a specially developed technique for measurement, the effect of varying pH on sand strength and quality of surface finish was studied. Variations over the range 5-11 had little effect on sand strength, none on casting finish. (E18r; ST)

365-E. **Mould Hardness: What It Means.** R. W. Heine, E. H. King and J. S. Schumacher. *Canadian Metalworking,* v. 21, Apr. 1958, p. 38, 40, 42.
(E18r, W19g)

366-E. **Heavy Casting at the Newcastle Steel Works.** Stanley G. Urane. *Castings,* v. 4, Feb. 1958, p. 7, 8, 11, 13, 15.
Mold making, casting and heat treatment of large steel rolls.
(E-general, W23k; ST)

367-E. **Advances and Advantages in Shell Moulding.** R. V. Keen. *Foundry Trade Journal,* v. 104, Apr. 10, 1958, p. 413-417.
(E19c),

368-E. **Production Methods for Shell-Moulded Cast Crankshafts.** H. N. Bogart and H. C. Grant. *Foundry Trade Journal* v. 104, Apr. 17, 1958, p. 451-459.
Ford Motor Co. Ltd. turns from forged to cast crankshafts.
(E16c, T21c)

369-E. **Foundries in the East Midlands.** *Foundry Trade Journal,* v. 104, Apr. 10, 1958, p. 419-427; v. 104, Apr. 17, 1958, p. 461-464.
Details on eight English foundries. (E-general, 18-67)

370-E. **Design of Die-Castings. Pt. 6. Some Structural Features of Die-Cast Parts.** H. K. Barton. *Metal Industry,* v. 92, Mar. 1958, p. 195-196.
(E-13, 5-61, 17-51)

371-E. **Influence of the Delivery Pressure on the Quality of Pressure Die Castings.** F. Richter. *Giesserei,* v. 43, no. 18, 1956, p. 540-547. (Henry Brutcher, Altadena, Calif., Translation no. 4050.)
Previously abstracted from original. See item 546-E, 1956. (E13)

372-E. (French.) **Capacity of Light Alloys to Produce Watertight Castings.** L. Grand and H. Garnier. *Fonderie Belge,* v. 28, Mar. 1958, p. 91-93.
(E-general, Q-general, Al, Mg)

373-E. (French.) **Nonmagnetic Castings.** Z. Tyszko. *Fonderie Belge,*

v. 28, Mar. 1958, p. 94-95.

Properties and possibilities of nonmagnetic castings (austenitic castings: Mn-Cu-Al, Mn-Si-Al; and new ferritic aluminum castings). (To be concluded.)
(E-general, Q-general; Al, Mn, Ni)

374-E.* (French.) **Manufacture and Application of Large Aluminum Pressure Die Castings.** A. F. Bauer. *Revue de l'Aluminium,* v. 35, Mar. 1958, p. 281-291.

Manufacture in U.S.A. Tonnage of Al pressure castings is higher than that of gravity and sand castings combined. Output of large parts requires very powerful casting machines, since high injection pressures improve quality of the metal. Manufacture of large molds, design of parts, testing methods. (To be continued.) (E13; Al)

375-E.* (German.) **Stability of Molding Sand at High Temperatures and Its Relationship to Casting Defects.** H. W. Dietert, V. M. Rowell and A. L. Graham. *Giesserei,* v. 45, Mar. 27, 1958, p. 157-166.

Origin of casting defects and experimental technique for detection of their causes. Types of scabbing; factors influencing scabbing—critical temperature, unaccommodated expansion and enclosed area and preventive measures; rat tails and sand humps and their prevention; testing of mechanical properties of sand in dry state and at heating is important to control casting defects. (E18r, E25; 9)

376-E. (German.) **Economic Efficiency of Sand Drying.** Eugen Schneider. *Giesserei,* v. 45, Mar. 27, 1958, p. 167-168.

Comparison of costs of plant-dried sand compared with ready-to-use dry sand. (E18r, 17-53)

377-E. (Hungarian.) **Properties of Phenolic Resins and Phenolic Sand System Used in Shell Molding Process.** Ambrus Győzö. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 1-5.

(E19c; NM-d)

378-E. (Hungarian.) **Foundry Experience With the Waterglass-Carbon Dioxide Process.** Racz Otto. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 5-11.

7 ref. (E18n)

379-E. (Hungarian.) **Mechanization of Shell Molding Process.** Kalman Lajos. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 22-23.

17 ref. (E19c, 18-74)

380-E. (Hungarian.) **Production Defects in Alpaca Plates Caused by Gas.** Hegedus Zoltan. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 34-38.

7 ref. (E25s; Cu, *Ni*)

381-E. (Russian.) **Foreign Practice in Casting Automotive Crankshafts.** P. I. Stepin. *Liteinoe Proizvodstvo,* Mar. 1958, p. 1-3.

Process development, especially in Ford plants and in W. Germany. Use of sand molds; shell casting. Composition, properties and technology of magnesium cast iron.
(E11, E19c, T21c; CI)

382-E. (Russian.) **Technological Factors Limiting Durability of Molds.** V. M. Pishchev. *Liteinoe Proizvodstvo,* Mar. 1958, p. 7.

Centrifugal casting in nonlined chill molds. (E14, W19g)

383-E. (Russian.) **Continuous Casting of Centrifugal Pump Rotors in Shell Molds Using Sodium Silicate Binder.** M. A. Corchuganov and V. M. Robustov. *Liteinoe Proizvodstvo,* Mar. 1958, p. 7-10.

Economic advantages of the method compared with use of bakelite. Mold preparation technique and necessary apparatus; casting technique. Manual pouring is a disadvantage of the method.
(E16c; 1-61; NM-f45)

384-E. (Russian.) **Mechanical Properties of Iron Die Castings.** G. K. Gedevanishvili and R. B. Zvenitskaya. *Liteinoe Proizvodstvo,* Mar. 1958, p. 10-11.

Laboratory die casting of two types of cast iron with pressure up to 12 kg. per sq. cm. Mechanical properties improved with increasing pressure. Similar effect of pressure remained also after heat treatment. (E13, 3-74; CI)

385-E. (Russian.) **Filling Molds by Automatic Conveyers.** I. B. Zaygerov. *Liteinoe Proizvodstvo,* Mar. 1958, p. 11-14.

(E23, 18-74)

386-E. (Russian.) **Inertia Knockout Grate for Heavy Castings.** G. Z. Lipovetsky and N. P. Burtsev. *Liteinoe Proizvodstvo,* **Mar. 1958, p. 14-16.**

Two types of knockout grate with 8 and 3 shock absorbers. Construction of suspending and supporting shock absorbers and vibrator.
(E24g, W19m)

387-E.* (Russian.) **Some Factors Influencing Hot Cracking in Steel Castings.** A. M. Lyass and Jow-Yao-Ho. *Liteinoe Proizvodstvo,* Mar. 1958, p. 20-24.

Linear contraction of nondeoxidized steel; nitrogen treated steel; nitrogen saturated steel; oxygen saturated steel; hydrogen saturated steel. Effect of heat absorption capacity of molds. Deformation of steel at high temperatures.
(E25; 9-72, ST)

388-E. (Russian.) **Closed Horizontal Cylindrical and Semi-Spheroidal Risers in Steel Casting.** M. D. Dvorkin, A. D. Nikiforov and V. I. Rudometkin. *Liteinoe Proizvodstvo,* Mar. 1958, p. 24-26.

Calculation and layout of risers, estimation of their diameter according to size of casting for round articles (gears, wheels, etc.) and for articles of different shape. Application of this type of riser decreased consumption of metal by 20-40%.
(E22q; ST)

389-E. (Russian.) **Molding Mixes Without Coal Dust for Iron Casting.** R. M. Stromberg. *Liteinoe Proizvodstvo,* Mar. 1958, p. 27.

For castings up to 100 kg. green sand molds can be used without addition of coal dust. Molds are powdered with graphite to prevent scaling. (E19a)

390-E. (Russian.) **Use of Oxygen Enriched Blast in Cupola Furnace 300 MM. in Diameter.** L. M. Azarkh. *Liteinoe Proizvodstvo,* Mar. 1958, p. 27.

Increase of temperature; decrease of slag. (E10a, W18d)

391-E. (Swedish.) **Design of Castings With Regard to Pouring.** Alrik Ostberg. *Gjuteriet,* v. 48, Mar. 1958, p. 33-36.

(E22, E23, 17-51)

F Primary Mechanical Working

136-F. Stainless Steel Processing Requires Special Rolling and Annealing Techniques. *Industrial Heating,* v. 25, Mar. 1958, p. 472-474.

Economy of operation demands that the greatest amount of reduction be accomplished per pass. Annealing between passes results in preferred grain orientation and recrystallization, enabling subsequent reductions. (F23c, J23; SS, 4-53)

137-F. Induction Heating Facilitates Axle Production. *Industrial Heating,* v. 25, Apr. 1958, p. 720-724.

(F22, J2g, T21c)

138-F. Production and Assembly of Strips for Mikrokator Movements. *Machinery (London),* v. 92, Mar. 28, 1958, p. 713-716.

(F23; Cu-s, 4-53)

139-F. (German.) **Smooth Rolling.** H. König. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 41-42.

(F23q)

140-F. Cold Rolling of Main Propulsion Shafting. *Bureau of Ships Journal,* v. 6, Feb. 1958, p. 20.

Procedure for increasing fatigue resistance of forged steel (MIL-S-890) used for propulsion shafting.
(F23, 1-67, Q7a, T7j; ST)

141-F. Practical Slide Rule Method for Calculating Percentage Reduction in Area in Working and Testing of Rod and Wire. A. F. Mohrnheim. *Wire and Wire Products,* v. 32, Dec. 1957, p. 1495-1497, 1522-1524.

Simple method for rapidly determining the minimum number of passes, sequence of die sizes and other mathematical wire mill problems. (F28, X14h)

142-F. Temperature of Distribution in an Ingot During Heating in Regenerative Soaking Pits. E. I. Kazantsev and M. N. Strelets. *Stal',* no. 4, 1957, p. 358-361. (Iron and Steel Institute, Translation no. 533.)

Previously abstracted from original. See item 170-F, 1957.
(F21b; ST-d, 5-59)

143-F. Modernization of Units of Slabbing Mill Equipment. B. M. Tsirlin. *Stal',* no. 3, 1957, p. 232-238. (Iron and Steel Institute, Translation no. 546.)

Previously abstracted from original. See item 151-F, 1957.
(F23n, W23a, 1-52)

144-F. Effect of Furnace Atmosphere on Scaling of Billets. Jean Moreau. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, 1956, p. 1973-1982. (Iron and Steel Institute, Translation no. 600.)

Previously abstracted from original. See item 1-F, 1957. (F21; ST)

145-F. Rationlization of Rail Pass Design. A. M. Karpunin. *Stal',* no. 6, June 1957, p. 536-540. (Iron and Steel Institute, Translation no. 625.)

Previously abstracted from original. See item 174-F, 1957.
(F23; ST, 4-57, 17-51)

146-F. Machines for Processing Medium and Heavy Plates. Friedrich Wilhelm Zurcher. *Stahl und Eisen,* v. 75, Sept. 8, 1955, p. 1182-1188. (Iron and Steel Institute, Translation no. 668.)

Previously abstracted from original. See item 246-F, 1955.
(F29, G1, ST)

147-F. Cold Rollability of Transformer Steels Containing More Than 3.3% Silicon. Franz Lihl and Paul Zemsch. *Archiv für das Eisenhüttenwesen,* v. 27, Oct. 1955, p. 599-602. (Iron and Steel Institute, Translation no. 553.)

Previously abstracted from original. See item 261-F, 1955.
(F23, Q23q; AY)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

148-F. (French.) **Cold Rolled Steel Extrusion.** Ben Kaul. *Machine Moderne,* v. 12, Mar. 1958, p. 9-16.

"Koldflo" method. (F24; ST)

149-F. (French.) **Latest Techniques in Extrusion of Aluminum.** Charles H. Wick. *Machine Moderne,* v. 32, Mar. 1958, p. 37-40.

(F24, W24g, Al)

150-F. (Russian.) **Continuous Tube Welding Machines.** Yu. A. Mednikov. *Metallurg,* Jan. 1958, p. 32-34.

(F26p, 1-2)

151-F. (Russian.) **Cold Drawing Thin Wire.** I. S. Pobedin, V. I. Bairakov, M. G. Uglov and V. G. Drozd. *Metallurg,* Feb. 1958, p. 32-34.

(F28)

152-F. Extra Forging Steps Yield Special Benefits. Herbert Chase. *Iron Age,* v. 181, May 1, 1958, p. 81-83.

Although additional forging operations increase initial costs, less machining is required in later stages, reducing over-all expense. (F22)

153-F.* Turn-Up and Turn-Down in Hot Rolling. G. E. Kennedy and F. Slamar. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 71-79.

Investigation of curvature indicates that it is more closely related to relative roll speeds than torque. Factors such as angle of entry and amount of edge working are much less significant. (F23, 1-66, 3-67)

154-F. Production of Seamless Casing and Tubing. Melvin Sumrall. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 138-139.

Steps in producing tubing from round billets, involving heating, centering, piercing, reeling and either sizing to produce casings or stretch reducing to produce tubing. (F26q, W23h)

155-F. Installation of Stretch Reducing Mill. Howard L. Mitchell. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 139-141.

(F26q, W23h)

156-F. Double Cooling Bed for Rod Mill. D. H. Driscoll and Clair Renberg. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 141-143.

(F23, W23d)

157-F. Quantity Production of Nails. *Machinery (London),* v. 92, Mar. 1958, p. 667-671.

Principal features of Ransohoff nail cleaning plant installed at Castle Works, Cardiff, England; processes involved in nail manufacture, before and after cleaning cycle. (F27, T7f; ST)

158-F. Welded Tubing at High Speeds. *Modern Industrial Press,* v. 20, Apr. 1958, p. 23-24.

Buick steps up production of exhaust pipes with new tube mill and improved bending and forming methods.
(F26p, W23h, T21b; 4-60, ST)

159-F.* The Working of Molybdenum and Its Alloys. W. L. Bruckart. Paper from "The Metal Molybdenum", American Society for Metals, p. 109-142.

Primary working of arc-cast molybdenum—preparation of ingots, extrusion procedures, rolling; limits for section size of Mo bar, plate, strip and sheet; forging; current practices in the primary working of powder metallurgy Mo; fabrication processes including sawing, shearing, slitting, punching, binding, deep drawing and machining, heat treatment and stress relieving.
(F-general, G-general; Mo)

160-F.* Fabrication at Very High Temperature Under a Controlled Atmosphere. J. D. Nisbet. Paper from "The Metal Molybdenum", American Society for Metals, p. 143-150.

Feasibility of hot working of Mo has been demonstrated by encasing a forging hammer in an appropriate enclosure filled with argon, with induction-heating facilities built in. Samples of Mo-Cb alloy declared unforgeable at steel working temperatures were readily forged. 4 ref. (F22; Mo)

161-F.* Forging of Molybdenum Alloy Turbine Blades. J. J. Russ and G. E. Schrader. Paper from "The Metal Molybdenum", American Society for Metals, p. 511-518.

Results indicated that precision turbine blades can be successfully forged from the 0.5% Ti-Mo alloy. To insure adequate strength properties for turbojet engine operation, at least 70 to 80% deformation must be performed below the recrystallization temperature. With properly processed forging stock and adequate controls of heating times and forging temperatures, blades with sufficient strength and resistance to recrystallization in service can be produced. 6 ref.
(F22, T7h, 17-57; Mo-b)

162-F. Phosphate and Waterglass Coating of Wire for Drawing. I. M. Goncharov. *Stal',* v. 17, no. 5, 1957, p. 464-465. (Henry Brutcher, Altadena, Calif., Translation no. 4076.)

(F28; NM-h)

163-F. (French.) **Recent Progress of Rolling Mills in the Metallurgy of Iron.** *Publications de l'Institut de Recherches de la Sidérurgie,* Series B, no. 34, Oct. 1957.

Modern practices in hot and cold rolling, blooming and slabbing; rolling mill types used in France, Italy and the United States.
(F23, W23; ST)

164-F. (German.) **Examination of Rolling Oils and Oil Emulsions by the Cold Rolling Test. Pt. 2. Rolling Tests With Commercial Rolling Oils Under Different Conditions of Operation Adapted to Practice.** Werner Lueg and Paul Funke, Jr. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 333-343.

14 ref. (F23; NM-h)

165-F. (German.) **Characteristics and Behavior in Service of Novel Rolling Oil Emulsions.** Joseph Billigmann and Walter Fichtl. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 344-357.

25 ref. (F23; NM-h)

166-F. (German.) **Effect of Rolling Conditions on Properties of Hot Rolled Low-Carbon Steel Strip. Pt. 1. Structure of the Scale and Behavior in Pickling.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 368-377.

11 ref. (F23, L12g; CN-g, 4-53)

167-F. (Russian.) **Piercing of Tube Billets With Water Cooled Mandrels.** M. M. Kaufman. *Stal',* Feb. 1958, p. 144-151.

(F26g, W23h)

168-F. (Russian.) **Prevention of Sticking of Low-Carbon Steel Sheet by Addition of Chromium.** G. M. Katsnel'son and M. W. Kravets. *Stal',* Feb. 1958, p. 156-158.

Reduction of sticking after hot rolling. (F23, 1-66; CN-g, *Cr,* 4-53)

G Secondary Mechanical Working

Forming and Machining

213-G. Quick-Frozen Water Clamps Honeycomb for Machining. H. H. Powell. *American Machinist,* v. 102, Feb. 24, 1958, p. 102-103.

(G17, G24, W25r, 7-59)

214-G. Where Stainless Is Lighter Than Aluminum. James B. Teeter and Rod Rohrberg. *American Machinist,* v. 102, Mar. 10, 1958, p. 132-133.

Clamshell, "anti-ice", stainless steel nozzles are formed in halves of a drop-hammer press and then welded together. Stainless steel replaces Al in this process, reducing fabricating costs 27% and cutting weight 50%.
(G14, T24, 17-57; Al, SS)

215-G. How to Machine Beryllium. D. R. Walker and J. Gubas. *American Machinist,* v. 102, Apr. 21, 1958, p. 129-131.

(G17; Be)

216-G. Gears Hard-Hobbed to Bypass Heat Treat Distortion. M. E. Samuelson. *American Machinist,* v. 102, Apr. 21, 1958, p. 142-144.

(G17b, T7a; ST, 9-74)

217-G. Drilling Small Holes by the Ultrasonic Method. N. K. Marshall. *Machinery,* v. 92, Feb. 14, 1958, p. 379-380.

Drilling 0.015-in. diameter holes in ferrite cores. (G24c)

218-G. Machining Crankshafts With Carbide Tools on Single-Purpose Lathes. *Machinery (London),* v. 92, Feb. 21, 1958, p. 443-444.

(G17a, T21c, T6n)

219-G. Cold Working of Metals at Ford. D. J. Davis. Digest of paper for Society of Automotive Engineers, Feb. 17, 1958. *Metal Progress,* v. 73, Apr. 1958, p. 132-138.

Cold extrusion of small parts improves product quality, reduces stock requirements, cuts cost and permits closer dimensional control than methods formerly used. (G5)

220-G. An Easier Way to Find Best Cutting Speed. H. J. Siekman. *Metalworking Production,* v. 102, Feb. 28, 1958, p. 365-368.

Optimum cutting speeds can be represented graphically as a range on a chart. Formulas and worksheet permit easy calculation of limits of high efficiency range without constructing curves. (G17, 3-67)

221-G.* Applications of Electrolytic Grinding. Pt. 1. C. R. Stroup. *Metalworking Production,* v. 102, Feb. 28, 1958, p. 370-373.

An electrically conductive, metal-bonded wheel impregnated with abrasive is required. Machining hard or refractory materials is the primary application, but the electrolytic principle can be applied to grinding with diamonds, carbide cutting tools, wear strips and dies, as well as Ni and Ti. Stainless steel, stainless steel honeycomb and high-alloy steels can be ground to burr-free finishes. Form grinding is improved and segments for lamination dies can be ground from solid blanks. (G18, G24d)

222-G. Ceramics Complement, Not Supersede, Carbides. *Metalworking Production,* v. 102, Apr. 4, 1958, p. 604-605.

(G17, T6n; 6-69, 6-70)

(*) Articles Available Through Photocopy Service; See Coupon, p. 59.

a vital and varied research program for metallurgists

223-G. Use of Explosive Charges for Forming Sheet Metal. A Report of Some Experimental Work in the U. S. A. Thomas A. Dickinson. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 213-215.
(G1, 4-53)

224-G. Are These Tomorrow's Machining Speeds? *Steel,* v. 142, Apr. 14, 1958, p. 138-140.
Workpiece is shot out of a rifle and grazes cutting tool at speeds as high as 162,000 surface ft. per min. (G17)

225-G. (German.) **Automation in Grinding and Polishing.** W. Burkart and O. Friedrich. *Industrieblatt,* v. 58, Feb. 1958, p. 35-37.
Review of modern equipment.
(G18, L10b, 1-52)

226-G. (German.) **Advantages of Centerless Fine Honing Machines in Machining of Cylindrical Pieces.** Ernst Thielenhaus. *Industrieblatt,* v. 58, Feb. 1958, p. 37-40.
(G19n, G19q)

227-G. (German.) **Blast Lapping.** Gert Dickoré. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 12-13.
(G19n)

228-G. (German.) **Precision Turning and Boring.** Alfons Gerson. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 13-18.
8 ref. (G17a, G17d)

229-G. (German.) **Precision Grinding and Surface Grinding.** R. Blohm. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 18-20.
(G18, G19)

230-G. (German.) **Precision Planing, Milling and Reaming.** O. Steppat. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 20-24.
7 ref. (G17b, G17c, G17e)

231-G. (German.) **Use of Ultrasonics in Machining.** W. Lehfeldt. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 28-30.
(G24c)

232-G. (German.) **Electric Machining.** G. Koschalke. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 31-35.
7 ref. (G24a)

233-G. (German.) **Precision Forming.** J. Goldsche. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 45-48.
(G4)

234-G. (Russian.) **Machining Hard Metals With Electric Conductive Abrasives.** I. K. Trushin. *Vestnik Mashinostroeniya,* Feb. 1958, p. 51-53.
(G24; EG-d)

235-G. (Russian.) **Effect of Cold Drawing on Surface of Titanium Alloys.** N. F. Pronkin. *Vestnik Mashinostroeniya,* Feb. 1958, p. 53-54.
(G4; Ti-b)

236-G. Blanking and Forming Titanium. W. A. Mays and G. J. Matey. *Aircraft Production,* v. 20, Feb. 1958, p. 52-60.
(G2h, G4, T24; Ti-b)

237-G. Machining Ultra-High-Tensile Steels. H. J. Pearson. *Aircraft Production,* v. 20, Feb. 1958, p. 75-83.
Evaluation of machinability and conditions of operation for turning and milling operations.
(G17; ST, SGB-a)

238-G. Automatic Tape Control Slashes Milling Bottlenecks. *Iron Age,* v. 181, Apr. 17, 1958, p. 103-105.
(G17b, W25r; 18-74)

239-G.* Property of Free Machining. Effects of Sulphur and Lead. K. G. Lewis. *Iron and Steel,* v. 31, Apr. 1958, p. 133-140.
Chip formation in resulphurized and leaded steels; free-machining properties obtained by sulphite treatment (as opposed to sulphur or sulphide additions); machinability of alloy steels and nonferrous alloys containing sulphur-type additions and/or other free-machining additives; effect of lead additions on machinability of steels; effect of sulphur additions on toolsteels. 47 ref.
(G17k, 2-60; AY, TS)

240-G. Working Titanium . . . Recent American Developments. *Light Metals,* v. 21, Apr. 1958, p. 116-118.
(G-general; Ti)

241-G. Shot Peening. H. O. Fuchs and E. R. Hutchinson. *Machine Design,* v. 30, Feb. 6, 1958, p. 116-125.
The process, application, effects, how and where to use it. 23 ref.
(G23n)

242-G. How to Fabricate Stainless Steels. Pt. 2. W. E. McFee. *Metal Products Manufacturing,* v. 15, Feb. 1958, p. 19-22.
Fabrication of various grades, good die practice, die lubricants, annealing, roll forming, spinning, cutting and shearing. (G-general; SS)

243-G.* Forgings and Machinability. G. H. Jackson. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 91-95.
Factors affecting machinability of drop forgings are composition and heat treatment. Small quantities of boron (0.0005%), and Ni and Cr (less than 5%) influence strength of ferrite. Nonmetallic inclusions. Manganese sulphide provides internal lubrication during cutting. Consistency of heat treatment should be maintained for uniform machining characteristics, grain size, crystallographic orientation; distribution affects heat treatment results.
(G17k, 2-60, 2-64; ST, 4-51)

244-G. Impact Extrusion. H. W. Byles. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 107-110.
Three methods of impact extrusion are backward extrusion, where the metal flows in the opposite direction to the movement of the punch; forward extrusion, where the metal flows in the same direction as the punch; and a combination of the two, where extrusion takes place in both directions. (G5)

245-G. Impact Extrusion With 32-to-1 Ratio. John R. Saul. *Metalworking Production,* v. 102, Feb. 21, 1958, p. 317-319.
(G4, 4-60, T2p)

246-G.* Design for Chemical Milling. Jay Sullivan. *Modern Metals,* v. 14, Apr. 1958, p. 54-62.
Chemical milling permits forming of parts impossible to machine, reduces weight of components. Cost factors in masking and patternmaking, capabilities and limitations of process. (G24b, 17-51)

247-G.* Two Ways to Machine Titanium Honeycomb. Allen C. Gilbrath. *Modern Metals,* v. 14, Apr. 1958, p. 78.
Honeycomb can be machined to tolerance of 0.0005 in. by filling with water and freezing beforehand. It can then be machined like a solid block. The other method uses a phenolic or Al sheet cemented to the bottom, and a vacuum chuck to hold the piece in place. (G17; Ti, 7-59)

248-G. Abrasive Belts Cut Roll Grinding Costs. *Steel,* v. 142, Mar. 31, 1958, p. 92, 94.
(G18, W25c)

249-G. New Wheel Rolling Plant in Use at the Nizhne-Tagilskoi Steel Combine. S. V. Makaev. *Stal',* no. 7, July 1957, p. 616-621. (Iron and Steel Institute, Translation no. 658.)
Previously abstracted from original. See item 436-G, 1957.
(G3, J-general; ST)

250-G. (French.) **What Type of Wheel for Grinding Flat Surfaces?** *Machine Moderne,* v. 12, Mar. 1958, p. 22-24.
(G18, W25c)

251-G.* (French.) **An Interesting Application of the Boring Process.** *Trempe,* v. 34, Jan. 1958, p. 41-46.
French plant uses Beisner boring method for mass production operations on stainless steel billets intended for fabrication of drawn tube. Boring tool has center hole for chip removal. Example of productivity: 37 m. of 34-mm. bore per 8-hr. day on billets 350 mm. long.
(G17d; SS, 4-52)

252-G. (French.) **Electrical Contact Wear in Spark Machining.** M. M. Marc Bruma and Jacques Roncin. *Wear.* v. 1, Feb. 1958, p. 305-316.
Experimental method for studying electro-erosion. 8 ref. (G24a)

253-G. Aluminum Turns a Profit. *Iron Age,* v. 181, Apr. 24, 1958, p. 114-117.
Aluminum machines best at high speeds, moderate feeds and depths of cut. Importance of proper tool selection for efficient machining at lowest cost. (G17, Al-b)

254-G. Magnesium Is Easy to Work With. *Iron Age,* v. 181, Apr. 24, 1958, p. 118-121.
Guide for best machining methods, precautions that must be followed. (G17; Mg)

255-G. Tips on Machining Copper and Copper-Base Alloys. *Iron Age,* v. 181, Apr. 24, 1958, p. 122-126.
(G17; Cu)

256-G. Guide to Machining Titanium. *Iron Age,* v. 181, Apr. 24, 1958, p. 126-127.
(G17; Ti-b)

257-G.* Automatic Contour Turning of Large Mill Rolls. William Hyams. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 82-89.
Lathes with 44-in. by 21-ft. centers and over used for mill roll turning. Capabilities and characteristics of various lathes.
(G17a, W23k)

258-G. Chemical Milling Light Metals. F. H. Reed. *Light Metal Age,* v. 16, Apr. 1958, p. 23-27.
(G24b; EG-a39)

259-G. Cutting Internal Gear Rings on a Liebherr Hobbing Machine. *Machinery (London),* v. 92, Mar. 21, 1958, p. 675-676.
Operations, equipment and plant layout at German firm of Hans Liebherr using case hardening steel to German specification C-45 (0.42-0.50% C, 0.15-0.35% Si, 0.5-0.8% Mn and 0.45% P and S).
(G17b, T7a, 18-67; ST)

260-G. Developments in Precision Bending Methods for Waveguides. F. J. Fuchs. *Machinery (London),* v. 92, Apr. 11, 1958, p. 824-834.
(G6, T1)

261-G. High Speed Cutting of Drawn and Extruded Sections. *Machinery (London),* v. 92, Apr. 18, 1958, p. 898-900.
Use of tungsten carbide tipped saw. (G17h, 6-69; Cu-b, Cu-n, Al-b)

262-G.* Spark Machining of Forging Dies. M. Rene Chevallier. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 135-138, 144. (Translation of paper issued by the Syndicat National de l'Estampage et de la Forge, France.)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

Essentials of the machine are: electrode carrying arm activated by servo motor; equipment for holding and controlling dies; a bath containing a dielectric liquid in which the workpiece is immersed. (G24a, 1-52, W22a)

263-G. Test Results on Electrolytic Grinding. F. Pearlstein. *Metalworking Production,* v. 102, Mar. 7, 1958, p. 418-420.
(G18, G24d)

264-G. Can Digital Flame-Cutting Pay? *Metalworking Production,* v. 102, Apr. 18, 1958, p. 675-680.
(G22g; 18-74)

265-G. A Fresh Look at Leaded Steels. W. Simon. *Product Engineering,* v. 29, Apr. 14, 1958, p. 72-73.
(G17, Q-general; *Pb*, ST)

266-G. Boost Your Machining Speeds. *Steel,* v. 142, May 5, 1958, p. 84-85.
(G17a, W25n; 17-53)

267-G. Extrusion Slashes Wheel Assembly Costs. *Steel,* v. 142, May 5, 1958, p. 88-89.

Hot extrusions used in making low cost turbine rotors. (G5, T7h)

268-G. Review of Recent Literature on the Mechanics of Metal Cutting. A. J. M. Spencer. *Brown University,* TR 5, Mar. 1957, 20 p.
(G17, 10-54)

269-G. (Dutch.) **Chamfering With the Torch Cutter, a Modern Tool for Pretreatment and Fabrication.** Jean Prat and Metz Sablon. *Lasttechniek,* v. 24, Mar. 1958, p. 42-49.
(G22g)

270-G.* (German.) **Machines for Electro-Erosion and Examples of Their Use.** F. W. Simonis. *Metall,* v. 12, Apr. 1958, p. 262-268.

Importance of automatic electrode feeding; factors influencing precision and surface quality; review of modern electro-erosion machines; examples of use of electro-erosion in manufacturing tools. (G24d, 1-52)

271-G. (German.) **Milling With Hard Metal Armored Cutter Head on Milling Machines of Old Design.** H. der Wiesche. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 156-162.

Construction and shape of tools; suitable types of hard metal; optimum working angles (free, chipping, chamfer, edge, setting); sharpening of cutters. (G17b, T6n)

H Powder Metallurgy

66-H. Cermets; Production and Testing. *Industrial Heating,* v. 25, Apr. 1958, p. 791-796.

Process whereby the components of a thermite are pressed into a desired shape and ignited to form a cermet. (H-general, 6-70)

67-H. (German.) **Porous Powder Metals. Fabrication and Use.** R. Palme. *Metall,* v. 12, Jan. 1958, p. 28-32.

27 ref. (H-general, 6-71)

68-H.* (German.) **Connecting Aluminum to Copper by Liquid Phase Sintering of Al-Cu Powder.** F. Erdmann-Jesnitzer and A. Arnold. *Metall,* v. 12, Mar. 1958, p. 179-185.

Experiments to determine the influence of various factors on durability. Most favorable results obtained at 600 C. with sinter pressure of 0.25-0.50 kg. per sq. mm. and sintering duration of 6 min. Influence of surface property, particle size and flux evaluated. 12 ref. (H15, H16e; Al, Cu)

69-H. (German.) **Sintered Parts.** G. Zapf. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 38-41.
(H15)

70-H. Porous and Infiltrated Metal. Pt. 1. Powder Metallurgy Applications, Bearings, Fundamentals of the Process. Pt. 2. Iron-Copper Materials, Sintered Iron Bearings, Sintered Components. J. E. Elliott. *Metal Industry,* v. 92, Apr. 11, 1958, p. 293-296; v. 92, Apr. 18, 1958, p. 307-309.
(H-general, H16e, T7d; 17-57, Fe, Cu)

71-H.* Consolidation of Molybdenum by Powder Metallurgy Practice. Howard Scott, W. A. Taebel and D. D. Lawthers. Paper from "The Metal Molybdenum", American Society for Metals, p. 51-79.

Molybdenum powder is quite vulnerable to contamination by air. The contaminants, chiefly oxygen and water vapor, have detrimental effects on the mechanical properties of the consolidated metal. Oxidation characteristics of Mo were studied to determine the conditions for pressing and sintering with minimum contamination. 7 ref. (H14, H15; Mo)

72-H.* Powder Metallurgy Molybdenum-Base Alloys. Robert I. Jaffee. Paper from "The Metal Molybdenum", American Society for Metals, p. 330-364.

Major difference between Mo-base alloys prepared by powder metallurgy and those produced by arc-casting is the superior hot breakdown fabrication characteristics of the powder metallurgy product. This is due to the finer initial grain size of the as-sintered alloy. Impurities are distributed over a much larger grain boundary area. Therefore, powder metallurgy alloys may be forged or rolled directly from the as-sintered condition and do not require the initial extrusion operation necessary for arc-cast material. 4 ref. (H-general, F22, F23; Mo)

73-H. Pressure Correlations in the Production of Hard-Metal Powder Compacts. A. G. Samoilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 2, Feb. 1957, p. 159-162. (Henry Brutcher, Altadena, Calif., Translation no. 4071.)

Previously abstracted from original. See item 83-H, 1957. (H14; W, 6-89)

74-H.* (German.) **Compound Materials (Cermets) Made of Aluminum Oxide and Iron or Iron Alloys.** Werner Jellinghaus and Toshimori Shuin. *Stahl und Eisen,* v. 78, Apr. 3, 1958, p. 419-429.

Fine-grained powder mixtures; pressing, sintering; density, structure, tensile, creep and impact strength; permeability of materials poor in oxides. Properties of oxide-rich materials; scaling resistance, electrical resistance. Effect of Ni, Cr and Mo additions on strength at elevated temperatures of Fe-Al oxide materials. 16 ref. (H-general; Al, Fe, 6-70)

75-H.* (German.) **Relation Between Particle Size, Depth of the Magnetically Heterogenous Surface Layer, Coercive Force and Saturation Magnetization of Carbonyl Iron and Magnetite Powders.** Karl Torkar, Othmar Scheikl and Heinrich Egghart. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 139-146.

Carbonyl iron powder of 0.0117 and 0.1-micron particle size and magnetite powder between 1 and 827-micron particle size were investigated as to coercive force and saturation magnetization. The maximum coercive force was found to be 160 for carbonyl iron and 110 Oe. for magnetite, originating from crystal anisotropic properties. These maxima were found to exist at particle sizes of 0.01 micron for carbonyl iron and at 1 micron for magnetite. 19 ref. (H11h, H11p; Fe)

J Heat Treatment

137-J. Symposium on Annealing of Low Carbon Steel. G. W. Form and E. B. Evans. *Industrial Heating,* v. 25, Mar. 1958, p. 523-538, 626; Apr. 1958, p. 739-744.

Effect of cold work, aging effects, effect of crystal directionality, effect of gas flow in melting, effect of variables in hot mill processing, effects of atmosphere, effect of various cycles. (J23, CN-g)

138-J. Automation in Heating and Quenching. Norbert K. Koebel. *Industrial Heating,* v. 25, Apr. 1958, p. 682-694, 836.

(To be continued.)
(J-general, J26, 18-74)

139-J.* Metallurgy of Tempering and Annealing in Fractional Minutes. R. K. Wuerfel. *Metal Progress,* v. 73, Apr. 1958, p. 93-96.

Conditions for annealing nonferrous metals and tempering steels can be put on master curves. Tests were made to show that the optimum time for annealing or tempering by fractional-minute induction heating can be calculated. (J2g, J23, J29, 3-67)

140-J. Re-Nitriding of Steel. G. J. Cox. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 47-51.
(J28k; ST)

141-J. Oils for the Quenching of Steel. H. E. Priston. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 57-64.
(J26; W28p; ST)

142-J.* Russian Induction Hardening and Forming. K. Z. Shepelyakovski. *Metalworking Production,* v. 102, Mar. 21, 1958, p. 501-504.

Two-stage induction hardening used in the manufacture of gears and in forging and stamping operations. (J2g, T7a, F21b)

143-J. (English.) **Grain Boundary Effect in Anneal Hardening of Alpha-Brass.** Gunji Shinoda and Yoshitsugu Amano. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 299-307.

6 ref. (J23, M27f, Cu-N)

144-J. Case Hardening "Hardened" Rods. Andreas Luksch and Paul B. Wallace. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 6-7.
(J28; ST, 4-55)

145-J. Salt Baths and Salt Bath Furnaces. Pt. B. Salt Bath Furnaces. Haig Solakian. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 8-9, 38-39, 52-53.

Conclusion. (J2j, W27m)

146-J.* Distortion and Cracking. F. D. Waterfall. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 97-100.

Distortion and cracking during heat treatment result from changes in shape and volume due to transformations and methods of heating and cooling.
(J-general, 9-74, 9-72; ST)

147-J. **Re-Nitriding of Steel.** G. J. Cox. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 101-106.

Chromium-molybdenum and Cr-Mo-V steels may be denitrided at 1000° C., machined and renitrided to provide a hard surface, while Al-containing steels do not respond to this treatment.
(J28k; AY, *Cr, Mo, V*)

148-J.* A Contribution to the Hardenability Problem in Titanium Alloys. R. P. Elliott and W. Rostoker. *American Society for Metals, Transactions,* Preprint no. 76, v. 51, 1957, 22 p.

Analysis of cooling curves of unalloyed Ti and two alloys containing 5% and 20% V, respectively, demonstrates that thermal diffusivity cannot be considered constant for all alloys. Two methods which permit the determination of thermal diffusivity, alpha, and quench severity, H, from quenching experiments; some characteristic values of alpha and H. 7 ref. (J5; Ti-b)

149-J.* Some Experiments on the Cause of Peeling in Whiteheart Malleable Cast Iron. C. T. Moore. *British Foundryman,* v. 51, Mar. 1958, p. 137-148.

Decarburization experiments performed upon excess-sulphur whiteheart iron on dry and moist Co-Co_2 atmospheres containing SO_2 indicate that amount and depth of sulphide penetration is greater with high CO_2 contents. (J4a; CI-s)

150-J. **Induction Heating of Cast Steel Ingots.** Michael C. D. Hobbs. *Canadian Metalworking,* v. 21, Apr. 1958, p. 32.
(J2g, F21b; ST, 5-59)

151-J. **Carburizing-Martempering Treatment for Crankshafts in New Type of Salt Bath Line.** *Industrial Heating,* v. 25, Feb. 1958, p. 284-286.
(J28q; J26p, W27m; ST)

152-J.* Distortion and Cracking. F. D. Waterfall. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 139-144.

Martempering reduces distortion occurring in hardening, and is applicable to small sections of water hardened steel, most sizes of oil-hardened steel, and all sections of Au-hardened steels. Causes of cracking during quenching, cracking during cooling (following carburizing), and cracking during grinding. (Concluded.)
(J26p, 9-72, 9-74; ST)

153-J.* Flame Hardening. G. Meredith. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 151-156.

Advantages for certain applications in relation to the principles of the method. Equipment required for general work and for special applications, points to be observed in hardening different ferrous materials. (J2h, 1-52)

154-J. **Aluminum Plate Production.** *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 163-168.

Thick, high-strength Al alloy plate for machining into integrally stiffened wing skins and similar aircraft parts, and Al plate in the medium-strength alloys, in wider sizes for the shipbuilding industry. Heat treatment, quenching, stress-relief by stretching and ultrasonic inspection processes.
(J27, J26, J1a, S13g; Al-b, 4-53)

155-J.* Effect of Heat Treatment on the Microstructure and Low-Temperature Properties of Pressure-Vessel Steels. J. H. Gross, E. H. Kottcamp and R. D. Stout. *Welding Journal,* v. 37, Apr. 1958, p. 160s-168s.

Specimens of ASTM A285, ASTM A212, ASTM A203, ASTM A302, ASTM A387, 48s5, HY65, HY 80 and T1 steels were austenitized, cooled at various rates and stress relieved. Data obtained include tensile properties, transition temperatures, notch toughness, end quenched characteristics and microstructures of these steels following various cooling and stress-relieving sequences. 4 ref.
(J22, J1a, Q-general, 2-63, M27; AY)

156-J.* Quantitative Evaluation of Residual Stress Relief in Pipe Weldments. Jack E. Cook and Roy B. McCauley. *Welding Journal,* v. 37, Apr. 1958, p. 179s-184s.

Study of distribution and relief of residual stress in 4-in. diameter SA 106 schedule 80 pipe butt welds. X-ray diffraction analysis used for quantitative measurement of residual stress. Effect of temperature, soak time and rate of heating on stress relief. 4 ref.
(J1a; AY, 4-60, 7-51)

157-J.* (Czech.) **Effect of High-Temperature Annealing on Transformer Sheet Properties.** Jan Kolofik. *Hutnické Listy,* v. 13, Mar. 1958, p. 241-245.

Heat treatment research showed possibility of reduction of watt losses to 0.9 w. per kg. In industrial annealing in large furnaces, equal temperature distribution and as high a vacuum is not possible, but losses of 1.00 w./per kg. are possible. For production of transformer sheets of same quality as produced abroad, units for high-temperature annealing in vacuum are necessary. Sheets with lower Al content can also be annealed by this process. 15 ref.
(J23; ST, SGA-n)

158-J. (German.) **Regulating Salt Baths for Heat Treatment.** Otto Schaaber. *Draht,* v. 9, Mar. 1958, p. 85-89.

Methods, using thin foils, rods or wire meshes, for accurately controlling the bath's carbon potential, which is a measure of the carburization obtainable with the bath. (To be continued.) (J2j, 1-52)

159-J.* (German.) **Controlled Atmospheres and Their Use.** O. E. Cullen. *Industrieblatt,* v. 58, Mar. 1958, p. 17-21.

Composition of a suitable atmosphere, its production and use in carburizing, carbonitriding, recarburizing and transcarburizing. Operating conditions. (J2k, J28; ST)

160-J.* (German.) **Carbonitriding at Temperatures Below A_1 in Salt Bath With Elevated KCNO Content.** F. W. Eysell. *Industrieblatt,* v. 58, Mar. 1958, p. 21-24.

Effect of bath composition on the formation of martensite zones. Effect of treatment duration and temperature. Bath control; properties of carbonitriding layers; dimensional alteration in carbonitriding.
(J28m, J2j; ST)

161-J. (Russian.) **Annealing of Cold Rolled Sheet Steel.** V. K. Barzii and S. S. Kolot. *Stal',* Feb. 1958, p. 159-161.

Effect of annealing conditions on yield point and ferrite grain size of cold rolled sheet steel.
(J23; ST, 4-53)

162-J.* (Swedish.) **Stress Relief of Stainless Steel Strips by Tempering.** F. deKazinczy. *Jernkontorets Annaler,* v. 142, Jan. 1958, p. 5-14.

Determination of internal stress distribution after cold rolling and tempering. Body stresses started to decrease below 100° C., and decreased to about half of their original value at 150°. Stresses produced by balancing external forces relax at higher temperatures. Both types can occur simultaneously. 5 ref.
(J1a, Q25k; SS)

K Assembling and Joining

228-K. **Spotwelding Titanium Is Practical.** W. R. Gain and D. E. Waite. *American Machinist,* v. 102, Mar. 10, 1958, p. 125-127.
(K3n; Ti-b)

229-K. **Welding Low-Alloy Steel Castings for High-Pressure and High-Temperature Service.** N. A. Chapin, C. H. Soldan and L. W. Songer. *American Society of Mechanical Engineers,* Paper no. 58-MET-4, Apr. 1958, 11 p.
(K-general; AY-b, 5-60, SGA-h)

230-K. **Welding Metallurgy of Cr-Mo-V Steels for High-Temperature Steam-Turbine Components.** R. J. Christoffel, R. M. Curran, F. H. Domina and C. H. Soldan. *American Society for Mechanical Engineers,* Paper no. 58-MET-7, Apr. 1958, 13 p. 7 ref.
(K-general, W11k; AY, *Cr, Mo, V*)

231-K. **How to Braze Stainless Steels. Pt. 3.** H. M. Webber. *Industrial Heating,* v. 25, Mar. 1958, p. 503-514; Apr. 1958, p. 708-710, 714.
(To be continued.) (K8j; SS)

232-K. **Production of Welded Steel Structures for Use in Aircraft.** B. R. Alsobrook. *Machinery (London),* v. 92, Mar. 1958, p. 548.
(K-general, T24, 17-57; ST)

233-K.* Ultrasonic Welding — a New Technique Grows. J. Byron Jones. *Metal Progress,* v. 73, Apr. 1958, p. 68-72.

Ultrasonic welding unites similar or dissimilar metals by introducing vibrational energy into the area to be joined. Solid-state metallurgical bonds, comparable in strength to those resulting from conventional methods, are produced. Thin gages, even in high-temperature, corrosion resistant metals, are readily welded.
(K6r)

234-K.* Which Adhesive for What? R. W. James and R. W. Gormly. *Product Engineering,* v. 29, Mar. 17, 1958, p. 79-81.

Structural adhesives are best under shear and tension while nonstructurals are better in peel and cleavage. Table of structural adhesives shows chemical type, bonding ability with metal, wood, glass, rubber, etc.; bonding requirements; resistance of bond to water, solvents, temperature; bond strength.
(K12)

235-K. **Leakproofing Sheet-Metal Assemblies.** J. R. Spurgeon. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 209-210, 212.

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

New method of producing integral fuel tanks for aircraft using P.T.F.E. (polytetrafluoroethylene) adhesive tape as a sealing medium. (K12, T24, 4-53)

236-K. (German.) **Disadvantages in Soldering Copper Steels.** *Metall,* v. 11, Nov. 1957, p. 958-959.

(K7; ST, *Cu*)

237-K. (German.) **Soldering of Lead Cable Sheaths.** H. Johnen and W. Jung-Konig. *Metall,* v. 12, Jan. 1958, p. 38-42.

(K7, T1b)

238-K. (German.) **New Developments and Progress in the Field of Welding Metallurgy of Ferrous Materials.** K. L. Zeyen. *Oerlikon Schweissmitteilungen,* v. 16, Jan. 1958, p. 9-108.

Comprehensive survey of the literature of welding; improvement of quality of welds through various electrode coats; avoidance of welding stresses and deformation. 533 ref. (K-general)

239-K.* (German.) **Experiments for Measurement of Working Temperature in Brazing.** J. Colbus. *Schweisstechnik,* v. 12, Jan. 1958, p. 3-6.

Measuring technique; control experiments and results; working temperature lies between solid and liquid points of the solder. (K8, S16)

240-K. Brazing—Indefinitely Indispensable. P. D. Johnson. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 2-5, 49-51.

(K8)

241-K. Liquid Cooling: Bernard's Answer to Hot, Slow Welding. *Welding Engineer,* v. 43, May 1958, p. 46-48.

A liquid cooling method which drains heat from electrodes and permits higher welding speeds. Used mainly on jobs requiring current of 700 amp. or more. (K1, 1-52)

242-K. New Automatic Process for Arc Welding Steel. *Welding Engineer,* v. 43, May 1958, p. 49-52.

Speeds up to 300 ipm. reportedly can be obtained with automatic welding process using a flux-containing coiled wire electrode which produces vapor shielding for an open arc. (K1)

243-K. Ultrasonic Welding Makes Rapid Advances. *Steel,* v. 142, Mar. 31, 1958, p. 80-81.

Method handles greater thicknesses, a wide variety of materials, produces stronger bonds, and is useful in seam welding and the joining of odd shapes. (K6r)

244-K. (Czech.) **Automatic Welding of Low-Alloy Steels Under Flux.** Julius Zeke. *Zvaranie,* v. 7, Jan. 1958, p. 2-8; v. 7, Feb. 1958, p. 54-56.

9 ref. (K1e; AY-b)

245-K. (Czech.) **Weldability of 3% Nickel, Chromium, Molybdenum, High-Carbon Steels.** Vaclav Pilous. *Zvaranie,* v. 7, Jan. 1958, p. 8-15.

8 ref. (K9s; SS-b, *Ni, Cr, Mo*)

246-K. (Czech.) **Welding of Locomotive Frames in the CKD-Works.** Rudolf Krnak. *Zvaranie,* v. 7, Jan. 1958, p. 19-23.

(K-general, T23n)

247-K. (Czech.) **Seam Butt Welding With Filler-Strip in Automobile and Motorcycle Production.** L. Pliva. *Zvaranie,* v. 7, Feb. 1958, p. 33-39.

(K3p, T10h, T21a; ST)

248-K. (Czech.) **Welding of Very Pure Aluminum for Production in the Chemical Industry.** Jaroslav Svejda. *Zvaranie,* v. 7, Feb. 1958, p. 49-53.

5 ref. (K-general, T29; Al-a)

249-K. (Czech.) **Argon-Arc Welding in Closed Vessels.** Jiri Lers. *Zvaranie,* v. 7, Feb. 1958, p. 57-59.

(K1d)

250-K. (French.) **How to Make Machinable Welds in Cast Iron.** *Machine Moderne,* v. 12, Mar. 1958, p. 67-68.

Factors influencing repair of broken castings by arc welding; correct choice of electrode and welding process. (K-general, G17k; CI, 5-60)

251-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by Institut de Soudure. Pt. 1. General Purpose of the Study. Experimental Methods Used.** A. Gaubert. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 5-14.

By use of automatic fusion machine, test welds were made with various types of deep penetration electrodes; main factors likely to influence penetration were pin-pointed and studied. Special emphasis to angle of slope of plates to be joined. Study of weld penetration. (K1a)

252-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by Institut de Soudure. Pt. 2. Use of Statistical Methods in Experimental Investigations.** G. d'Herbemont. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 15-20.

Quantitative study of influence of main factors governing penetration carried out by statistical methods. Experimental procedures; interpretation of results. In practice, each type of electrode can be assigned coefficients characterizing its behavior. (K9r, S12)

253-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by the Institut de Soudure. Pt. 3. Results. Influence of Current Intensity and of Geometrical and Kinematic Parameters on Penetration.** A. Gaubert. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 21-24.

Penetration can be expressed linearly in terms of current, speed of feed, angle of slope and amount of separation between plates, and electrode diameter. Formula for practical use. Results of tests can be applied to manual as well as automatic welding. (K1a)

254-K.* (French.) **Welding of High-Temperature Steels and Alloys.** H. Gerbeaux. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 53-61.

Classification of steels and alloys according to service temperature limits; mechanical properties, applications of heat resistant metals; welding techniques available and conditions of use; role of stresses, temperature and atmosphere in selection of metals for specific applications. (K-general, 17-57; SGA-h)

255-K. (German.) **Efficiency of Current Sources in Arc Welding.** E. Bergmann. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 77-79.

Characteristics of transformer, motor-generator, rectifier and multioperator system used in arc welding; comparison of properties; principles for choice of suitable power sources in welding practice. (K1, W29c)

256-K.* (German.) **Welding of Titanium.** Klaus Rüdinger. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 79-86.

Effect of oxygen and nitrogen on properties of weld; preparation of welding surfaces; required purity of protective gas; use of protective chamber and other protective methods; suitable velocity of protective gas stream; conditions in arc welding of Ti; heat treatment and mechanical properties of weld. (K-general; Ti)

257-K.* (German.) **Inert Tungsten Arc Welding of Nodular Cast Iron.** Jürgen Ruge and Werner Zitzelsberger. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 86-90.

Investigation on welding technique; effect of welding conditions; pre-treatment and post-treatment; use of heterogeneous covering materials; structure and mechanical properties of weld. Practical tips for welding technique. (K1d; CI-r)

258-K.* (German.) **Tensile Strength and Bending Angle of Fusion Welded Notched Specimens.** H. Fiehn and K. Teske. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 90-93.

Examination of mechanical properties on welded sheets by notch tensile and notch bending tests. Preparation of specimens and experimental technique. Effect of impairments of welded parts on their properties. Evaluation of results. (K9r, Q-general, 1-54)

259-K. (Italian.) **Pipe Welding. Pt. 7. Techniques and Accessories Employed.** Carlo Losito. *Rivista di Meccanica,* no. 178, Feb. 1, 1958, p. 9-15.

5 ref. (To be continued.) (K-general, 4-60)

260-K. Automatic Brazing Speeds Making of Coils for Carrier Corp. Harry E. Miller. *Industrial Gas,* v. 36, Apr. 1958, p. 6-8.

(K8, 18-74; Cu, 4-60)

261-K. How to Braze Stainless Steels. Pt. 1. H. M. Webber. *Industrial Heating,* v. 25, Feb. 1958, p. 247-254, 400-402.

Important considerations and characteristics of base and filler metals so that proper thickness of joint, required wettability and optimum furnace conditions can be ascertained to insure tight bonds. (K8j; SS)

262-K. 5 New Brazing Alloys for High-Temperature Service. A. M. Setapen. *Industry & Welding,* v. 31, May 1958, p. 51-52, 54-55.

Composition, properties and industrial applications of Ag-Cu-Li, Ag-Pd, Mn-Ni, Ni-Cr-Si-B and Au-Cr-Ni heat resistant alloys for rocket and jet engine assemblies. (K8, SGA-h, SGA-f)

263-K. Designed for Arc Welding. G. A. Marberg. *Industry & Welding,* v. 31, May 1958, p. 58, 62-63.

Welded equipment for processing and manufacturing can be built faster at less cost because no patterns are needed, slow casting and machining are avoided, standard steel shapes and weld symbols are used for designing. The equipment made will be lighter, sturdier and better looking. (K1, 7-51, 17-51)

264-K. Design and Fabrication by Welding of the Carquinex Strait Bridge. Leonard C. Hollister. *Welding Journal,* v. 37, Apr. 1958, p. 309-319.

Cantilever truss-type structure fabricated by submerged arc welding of T-1 steel. (K1e, T16n, 17-51; ST)

265-K.* **Automatic Welding of Aircraft Accessory Turbine Wheels.** A. J. Rosenberg and E. W. Jamison. *Welding Journal,* v. 37, Apr. 1958, p. 328-335.

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

Development of automatic inert-gas-shielded metal-arc welding procedure for turbine wheels consisting of AISI 4340 steel hubs and cast cobalt-base high-temperature alloy buckets. Difficulties including radial cracking, fusion-line cracking, transformation cracking, center-bead cracking and porosity. Procedure for minimizing defects; comparison of automatic and manual metal-arc welding processes.

(K1d; AY, 9-72, 9-68)

266-K.* Tungsten-Arc Welding of 0.002-In. and 0.005-In. Stainless Steel and Titanium. Jay C. Collins and S. P. Jenkins. *Welding Journal,* v. 37, Apr. 1958, p. 342-347.

Equipment, procedure and mechanical properties of joints in welding 0.005-in. 17-7PH stainless steel by helium-shielded tungsten-arc process. Flange-type joint gave welds of satisfactory dimensional tolerance. (K1d; SS, Ti)

267-K.* New Forge Welding of Aluminum and Magnesium Alloys. L. A. Cook and D. G. Shafer. *Welding Journal,* v. 37, Apr. 1958, p. 348-358.

Principles, equipment and procedure for forge welding high-strength Al and Mg alloys. Metallographic, hardness and tensile characteristics of weld. Welds in high-strength Al and Mg alloys developed 95 to 100% joint efficiency. 44 ref.
(K5; Al, Mg)

268-K.* Spot Welding of Ti-6Al-4V Alloy. R. K. Nolen, J. F. Rudy, H. Schwartzbart and H. D. Kessler. *Welding Journal,* v. 37, Apr. 1958, p. 129s-137s.

Electrode geometry, weld time, electrode force, welding current and weld spacing were varied to determine their relation to cross tension strength, tension shear strength, microstructure and elevated-temperature strength of spot welds made in Ti-6 Al-4V alloy.
(K3n; Ti-b)

269-K.* Seam Welding Galvanized Steel. W. J. Allen and M. L. Begeman. *Welding Journal,* v. 37, Apr. 1958, p. 138s-143s.

Changes in welding current, current timing and electrode force required to produce acceptable seam welds with zinc-coated steel sheet. Effect of Zn coating on mechanical properties, metallurgical characteristics and corrosion resistance of the weld metal. (K3p; ST, *Zn*, 8-65)

270-K.* Hydrogen in Mild Steel Welds. M. LeFevre. *Welding Journal,* v. 37, Apr. 1958, p. 168s.

Effects of moisture in electrode coat, humidity, interpass temperature, time interval between passes and degassing on the hydrogen content of mild steel welds.
(K1a; CN, *H*, 7-51)

271-K.* Effects of Steel-Making Practice on Submerged-Arc Weld Porosity. James T. Lapsley. *Welding Journal,* v. 37, Apr. 1958, p. 169s-178s.

Nominally similar low-carbon steels representing four deoxidation practices including Al-Si semikilled, Si semikilled, Al-capped and mechanically capped steels were welded by submerged-arc processes. Effect of deoxidation practice, teeming sequence, ingot variations, rolled sheet variations and chemical composition on weld porosity.
(K1e, D-general, 3-70; CN-g, 9-68)

272-K.* Dynamic Measurement of Stress Associated With Weld Cracking. S. S. White, W. G. Moffatt and C. M. Adams. *Welding Journal,* v. 37, Apr. 1958, p. 185s-192s.

Techniques and specimen geometries developed which permit dynamic measurement of stresses during and after welding by use of conventional strain gages. Measurements and stress analysis indicate medium-carbon filler welds on Mn-Mo steel plate can support maximum stress of about 40,000 psi. before cracking of the welds during cooling and that low-carbon, low-alloy filler welds in the same material can support a maximum stress of about 25,000 psi. Maximum transverse distributed load which precedes cracking appears to be less dependent on welding conditions than upon filler compositions. 19 ref. (K9r, Q25; 7-51, 9-72)

273-K. How to Weld Copper and Its Alloys. Pt. 4. Lester F. Spencer. *Steel,* v. 142, May 5, 1958, p. 106-108.
(K3, 4-53; Cu)

274-K.* Welding of Molybdenum. W. N. Platte. Paper from "The Metal Molybdenum", American Society for Metals, p. 151-191.

Shielding is necessary to prevent contamination of the weld metal by oxygen and nitrogen. For sound welds with maximum ductility, welding atmosphere must contain less than 0.005% O. Nitrogen in the argon should be low enough so it will not enter the weld metal. Addition of 0.5% Ti to Mo containing 0.05% C will give the best (lowest) ductile bend transition temperature for welds. 11 ref. (K1d; Mo)

275-K.* Brazing of Molybdenum. Robert E. Monroe. Paper from "The Metal Molybdenum", American Society for Metals, p. 192-198.

Tabulation of suitable filler metals. Molybdenum can be furnace brazed in inert or hydrogen atmospheres or in vacuum, oxy-acetylene torch brazed with suitable fluxes, and induction brazed. Properties of joints. 6 ref. (K8; Mo)

276-K. (Czech.) **Automatic Resistance Butt Welding From the Point of View of Economy in Production.** Boleslav Vrana. *Zvaranie,* v. 7, Mar. 1958, p. 75-79.
(K3)

277-K. (Czech.) **Adjustable Time-Panels for Asynchronous Control of Spot-Welders.** Karel Jarsky. *Zvaranie,* v. 7, Mar. 1958, p. 79-83.
(K3n, W29c)

278-K. (French.) **Use of Inert Gases in Automatic and Semi-Automatic Welding.** G. Gronier. *Technique Moderne,* v. 50, Feb. 1958, p. 41-43.
(K1d)

Cleaning, Coating and Finishing

328-L. Pointing Out Pluses of Fine-Grain Plating. *Chemical Week,* v. 82, Mar. 22, 1958, p. 29, 32.

Fine grain is achieved by depositing the Ni from a standard nickel sulphate bath, containing no organic additives, onto a mandrel coated with about 15% (by weight) resinous binder (e.g., plasticized vinyl) and 85% conductive material (e.g., graphite, powdered metal) having extremely small particle size.
(L17, *Ni*)

329-L. Electroplating of Screws and Other Small Parts. Pt. 3. Werner Peters. *Draht (English Edition),* no. 33, Feb. 1958, p. 19-24.

Factors determining the increase of the deposited layer which therefore affect the calculation of the thickness of the deposit; effective surface area of the material, current, plating period, current distribution, distribution of the deposit and other losses. (L17)

330-L. Auxiliary Equipment for Plant Finishing. Allen S. Dawe and John A. Kinn. *Industrial Heating,* v. 25, Mar. 1958, p. 559-566.
(L26, 1-52)

331-L. Firing Vitreous Enamels on Aluminum in a Conveyorized Oven. L. T. Ives. *Industrial Heating,* v. 25, Apr. 1958, p. 771-778.
(L27, W4k; Al)

332-L.* Improved Method for Hard Surfacing of Aluminum. John Starr. *Light Metal Age,* v. 16, Feb. 1958, p. 35-36.

Method for producing thick aluminum oxide coatings utilizes acid electrolyte, low temperatures, and electrical current; properties of coating. (L17, Al)

333-L. Quantity Production of Motor Car Bumpers. C. Starzman. *Machinery (London),* v. 92, Feb. 21, 1957, p. 421-425.
(L-general, T21c)

334-L. Some Thoughts on the Treatment of Surfaces by Anodic Oxidation. J. M. Kape. *Metal Finishing Journal,* v. 4, Feb. 1958, p. 39-43.
(L19; Al)

335-L. Rational Approach to Surface Treatment of Sheet Iron and Steel Articles. *Metal Finishing Journal,* v. 4, Feb. 1958, p. 53-60.
(L-general, A5; ST, Fe, 4-53)

336-L. Depositing Silver Coatings on Glass, Ceramic, Wood, Ivory, and Similar Materials. Elias Schore. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 80-82.
(L-general, T9; *Ag,* NM)

337-L. Rational Approach to Paintshop Layout for Painting Parts of Varying Type. B. van der Bruggen. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 83-88.
(L26, 18-67)

338-L. Rhodium Plating of Commutator Segments. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 89, 93.
(L17, T1; *Rh*)

339-L. Electrolytic Descaling of Titanium Alloys. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 95-96.
(L13; Ti)

340-L. Some Notes on American Experience in Plating With Ultrasound. Harry A. Reich. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 97-98.
(L14, L17; 1-74)

341-L.* Vapor Plating of Nickel. L. W. Owen. *Metal Industry,* v. 21, Mar. 1958, p. 227-230.
Nickel coating from nickel carbonyl vapor. Design of equipment.
(L25, 1-52; *Ni*)

342-L. Chelating Agents: Their Value and Applications in Metal Finishing. D. J. Fishlock. *Metal Industry,* v. 92, Apr. 4, 1958, p. 271-273.
(L17a)

343-L.* Stress-Free Nickel Plating. *Metal Progress,* v. 73, Apr. 1958, p. 90-92.

Nickel in stress-free condition or with compressive stress can be plated from a sulphamate bath. It is finding a number of engineering applications on parts plated to improve fatigue life and minimize fretting and wear, and in electroforming to avoid distortion. It holds promise for improved high-

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

temperature coatings for missiles and rockets. (L17a, Q25; *Ni*)

344-L.* Which Finish for Zinc Die Castings. Ray Stricklen. *Product Engineering,* v. 29, Mar. 3, 1958, p. 59-61.

Chart for ten finishing processes, mechanical, chemical, plating and painting methods, with the number of preparation steps needed for a given finish. Basic data for each type of finish: purpose, appearance, resistance to weathering, wear, humidity, salt spray; preparation required; application methods; relative cost; government specifications available; and special properties. (L-general; Zn, 5-61)

345-L.* Textured Steel. Ford R. Park. *Product Engineering,* v. 29, Mar. 17, 1958, p. 73-78.

Synthetic and porcelain enamels, lacquers, plated metals, oxidized coatings, plastic laminates and effects like wood grain, leather and cloth give texture to steel surfaces and fittings. Textured steel is produced by rolling sheet or strip stock between forged steel rolls, one or both of which carry the pattern. (L29; ST, 4-53)

346-L. Pre-Treating and Painting the Vickers Vanguard. *Product Finishing,* v. 11, Feb. 1958, p. 60-67.

Surface flaws and cracks in metal parts detected by dye penetration method. Cleaning and painting processes for subassembly parts of skin, wing plates and details. (L12, L26, S13k)

347-L. Electroplating Explained. A Course for the Practical Plater. Pt. 1. Inorganic Chemistry. H. Hartley. *Product Finishing,* v. 11, Feb. 1958, p. 68-73.

(To be continued.) (L17; NM-a)

348-L.* Bright Nickel Plating. Pt. 2. Process Details. D. J. Fishlock. *Product Finishing,* v. 11, Feb. 1958, p. 80-94.

Current British practice in Ni plating; pretreatment, etching solutions, plant equipment, Ni anodes. 27 ref. (L17; *Ni*)

349-L. Post-War Development of the Tinplate Industry in Western Europe. Pt. 3. Belgium and the Netherlands. W. E. Hoare. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 181-187.

(L13, L16, L17; *Sn*)

350-L. Application of Precoated Steel Sheets in Industry. E. Marks *Sheet Metal Industries,* v. 35, Mar. 1958, p. 195-201.

Production and uses of tinned, terne, lead and phosphate-coated sheets, blue-planished sheets, aluminized sheets and plastic-coated sheets. 11 ref. (L16, L14a, L14c; ST, 4-53)

351-L. Conductor Wire Plated Continuously. *Steel,* v. 142, Mar. 24, 1958, p. 118, 121.

Copper coating on steel core for telephone drop wire. (L17, T1b; ST, *Cu*)

352-L. (German.) **Corrosion Protection of High-Frequency Measuring Apparatus.** Werner Junge. *Feinwerk Technik,* v. 61, Dec. 1957, p. 427-430.

(L-general, X10)

353-L.* (German.) **Hard Chromium Plating and the Tool Industry.** Karl Schopper. *Industrieblatt,* v. 58, Feb. 1958, p. 40-44.

Advantages of Cr plated tools are less friction, higher stability, lower fluctuation of cutting strength, resistance to corrosion. Principal disadvantage is brittleness. Suitable steel for tools and various types of plating; examples; sharpening and heat treatment. (L17; TS, *Cr*)

354-L. (German.) **Automatic Washing and Etching Units for Up to Date Surface Treatment.** Heinz Anders. *Industrieblatt,* v. 58, Feb. 1958, p. 53-55.

Modern equipment for degreasing, etching, passivating, phosphating. Suitable chemical agents; handling equipment; dipping and spraying methods; combined degreasing-etching methods. (L12, 1-52)

355-L.* (German.) **Pickling of Brass Strips in Dilute Sulphuric Acid.** M. Stammler and F. Neumuller. *Metall,* v. 11, Nov. 1957, p. 945-947.

Pickling of brass with oxidized surface is performed through a reaction between the metal oxide and the acid. During the second reaction through an electrochemical process the dissolved Cu is precipitated and Zn dissolves. (L12g; Cu-n, 4-53)

356-L. (German.) **Protection Against Corrosion by Electroplating.** J. Elze. *Metall,* v. 12, Jan. 1958, p. 32-38.

Kind of material to be coated, surface finish, desired appearance, service conditions and cost determine choice of coating. Electrochemical reaction between base material and coating, information on right thickness and typical characteristics of various coatings. (L17)

357-L. (German.) **Anodizing and Its Application in Metal Structures.** M. Gottschalk. *Metall,* v. 12, Mar. 1958, p. 209-214.

Purpose and characteristics of anodic oxidation; selection of materials; technique of preparation, treatment and post-treatment. Control and care of finished parts; cost calculation; applications. (L19)

358-L. (German.) **Chemical and Electrolytic Polishing.** J. Heyes. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 25-27.

8 ref. (L12, L13p)

359-L. (Russian.) **Effect of Electromechanical Scraping on Surface Layer of Iron.** B. M. Askinazi and B. G. Alekseev. *Vestnik Mashinostroeniya,* Feb. 1958, p. 59-61.

(L10h, S15; Fe)

360-L. Vapour-Blasting of Tools. *Aircraft Production,* v. 20, Feb. 1958, p. 61-63.

Tests in machining turbine blades with and without vapor-blasted tools to determine effect of process on lengthening tool life. (L10c, T6n)

361-L. Special Machine Anodizes Chevrolet Grille and Headlamp Bezel. *Automotive Industries,* v. 118, Feb. 1, 1958, p. 58-59, 115.

(L19, 1-52, T21c; Al-b)

362-L. Special Purpose Shot Blasting Installations. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 55-58.

Four installations designed for mechanical cleaning of steel strip or large and unusual castings. (L10c; 4-53, 5-60, ST)

363-L.* Protective Coatings Based on Bitumen. John Stanford. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 62-64.

Origin and use. Colored coatings formulated with synthetic resins, solvents and pigments. Aluminum metal flakes yield a good coating. (L26a; *Al*)

364-L. Precision Barrel Finishing of Aluminum Alloy Castings. E. A. Reynolds. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 24-25.

(L10d; Al-b, 5-60)

365-L. Electro-Deposition of Zinc: Russian Experiments on Effect of Divalent Manganese. W. G. Cass and Yu. B. Kletenik. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 32. (From *Zhurnal Prikladnoi Khimii,* v. 8, 1957, p. 1250-1252.)

(L17a, P15m; *Zn, Mn*)

366-L. Bright Tin Plating May Oust Mechanical Polishing. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 35-36.

(L17a; *Sn*)

367-L. Ceramic Coatings Prevent Corrosion. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 40-42, 44, 46.

Research and development techniques in the use of ceramic coatings to protect metals from high-temperature atmospheric corrosion. (L27, R3n; NM-g34)

368-L. Is Automatic Hardfacing for You? Spencer Payne. *Welding Engineer,* v. 43, May 1958, p. 32-33.

Cost factors and limitations involved in hard facing of metal components subjected to heavy wear. (L24)

369-L. Spray and Fuse, a Popular Hardfacing Method. H. S. Gonser. *Welding Engineer,* v. 43, May 1958, p. 34-36.

Parts are grit blasted and coated with hard facing powder. The powder is then fused to form a molecular bond between coating and base metal. Method of determining maximum thickness of coating, details of preparation of parts. (L24)

370-L.* Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 43, May 1958, p. 40-45.

Specifications, description, applications for 45 types of filler metals used in hard facing. (L24; SGA-f)

371-L (French.) **Causes, Remedies and Prevention of Silver Plating Defects.** Andre Saglier. *Galvano,* v. 27, Mar. 1958, p. 27-31.

(To be continued.) (L17, 9-70; *Ag*)

372-L. (French.) **Some General Remarks on Galvanizing.** A. Herz. *Metallurgie et la Construction Mecanique,* v. 90, Feb. 1958, p. 107-110.

(L16; *Zn*)

373-L.* (French.) **Ultrasonic Cleaning of Metal Parts and Optical Lenses.** Marcel Boyer. *Trempe,* no. 34, Jan. 1958, p. 28-33.

Equipment and application. 13 ref. (L10f)

374-L.* (German.) **Testing of Paint Coats.** D. Wapler. *Metalloberfläche,* v. 12, Apr. 1958, p. 113-119.

Modern state of paint coat testing. Relationship between working conditions and test conditions; methods of determining coat thickness; testing physical and mechanical properties of coats, testing stability. (L26n, 1-54; NM-g30)

375-L. (German.) **Concentration Changes in Electroplating Baths.** A. V. Krusenstjern and H. Schlegel. *Metalloberfläche,* v. 12, Apr. 1958, p. 119-122.

Experimental electrolysis for the purpose of examination of mechanism; importance of diffusion polarization. (L17a)

376-L.* (German.) **Effect of Welding Conditions on Compostion and Structure of Deposited Hard Chromium Alloys.** Helmut Koch and Elmar Bernholz. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 71-76.

Composition and structure of filler alloys; essentials for transformation

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

hardness by martensite formation in basic structure; effect of welding conditions on hardness and wear resistance; use of double electrodes; phase diagrams. (L24, Q29; Q9n; Cr)

377-L. (German.) **Surface Treatment of Blooms and Intermediate Products by Means of Mechanical Flaming. Pt. 1.** H. E. Habbig and A. Pfeuffer. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 94-98.

Development of process and its mechanism; manual and mechanical flame treatment; types of machines; gas consumption. (L10g, 4-52)

378-L.* (Italian.) **Bright Chromium Plating of Light Alloys.** F. Sacchi. *Galvanotecnica,* v. 9, Jan. 1958, p. 1-16.

Prefinishing operations, including pickling, etching, undercoating with Zn, Cu, brass, Ni; final Cr plating; techniques and processes in Europe and U. S. A.; influence of pickling solutions, etchants, undercoatings on corrosion resistance and adherence of Cr deposits. 26 ref.
(L17, L12g; Al, Mg, *Cr*)

379-L.* (Italian.) **Filling Blowholes in Castings by the Metallizing Process.** Gian Giacomo Caccia. *Rivista di Meccanica,* v. 9, Jan. 18, 1958, p. 55-58.

Metal spraying is more economical than other methods for salvaging large or complicated defective castings since only defective areas are treated. Preparatory steps and spraying techniques for repair of iron, carbon steel, stainless, brass, bronze and copper castings. (L23, E26)

380-L. (Russian.) **Facing With Hard Metals.** M. A. Tylkin and M. I. Kershtein. *Metallurg,* Jan. 1958, p. 5-6.

Fusing stalinite, sormite and metallic electrodes on working surfaces by electric arc considerably extends length of service of knives, spades and other implements. (L24)

381-L. (Russian.) **Reagent for Electrolytic Cleaning of Chromium-Nickel Austenitic Alloys.** Yu. B. Malevskii. *Zavodskaya Laboratoriya,* Jan. 1958, p. 111-112.
(L13n; SS)

382-L. Industrial Baking Enamels. Pt. 3. E. G. Shur. *Industrial Finishing,* v. 26, Mar. 1958, p. 26, 28, 30, 32, 34, 36, 40.

Comparative evaluation of the relative merits of paint versus porcelain; or organic versus inorganic coating over steel. (L26n; L27; ST)

383-L. Vacuum Metallizing: Metal and Plastic Products. Chas. Matilo, Jr. *Industrial Finishing,* v. 26, Mar. 1958, p. 62-64.
(L23, 1-73)

384-L. Twin Finishing System for Flo-Coating and Spraying of "Utility" Appliances. *Industrial Heating,* v. 25, Feb. 1958, p. 335-342.

Conveyorized completely automatic finishing system. (L26n, 18-74)

385-L. Ceramic Coating of Magnesium. Paul A. Huppert. *Light Metal Age,* v. 16, Apr. 1958, p. 8-10.
(L27; Mg)

386-L. Examples of Fixtures Employed for Barrel-Finishing. *Machinery (London),* v. 92, Apr. 11, 1958, p. 841-842.
(L10d, W2s)

387-L. Automatic Plating for Automobile Components. *Metal Industry,* v. 92, Apr. 18, 1958, p. 313-316.
(L-general, T21c; 18-67, 18-74)

388-L. Metal Laminates Come of Age. Arvin Develops Processes for Drawing, Spot Welding and Plating Vinyl-Metal Laminates. *Modern Industrial Press,* v. 20, Apr. 1958, p. 19-20.
(L26p, K11d, 7-58)

389-L. Cleaning and Preparation of Metals Prior to Electroplating. Effect of Oxide Films. Pt. 10. Experimental Results. Henry B. Linford and David O. Feder. *Plating,* v. 45, Apr. 1958, p. 349-359.

Oxides were applied to degreased and hydrogen reduced Cu surfaces. Ni was plated from a high-pH Watts bath without allowing contact with air. 15 ref.
(L12, L17; *Ni*, Cu)

390-L. Electroplating Research at the International Nickel Co. Research Laboratories. *Plating,* v. 45, Apr. 1958, p. 360-365.
(L17, A9h)

391-L. Bright Nickel Plating. Pt. 4. Deposit Characteristics. D. J. Fishlock. *Product Finishing,* v. 11, Apr. 1958, p. 79-90.
17 ref. (L17a; *Ni*)

392-L. Electroplating Explained. A Course for the Working Plater. Pt. 3. Measuring Instruments. H. Hartley. *Product Finishing,* v. 11, Apr. 1958, p. 96-102.
(L17, X7a, X9n, X3n)

393-L. Plating Helps Titanium. *Steel,* v. 142, May 5, 1958, p. 102-104

Chromium plating overcomes galling and seizing tendencies. Cu and Ni are used as undercoatings. Missile makers use electrical and electroless methods.
(L17a, L28; Ti, *Cr, Cu, Ni*)

394-L.* Techniques for Coating Metals With Molybdenum. Seymour Senderoff. Paper from "The Metal Molybdenum", American Society for Metals, p. 199-213.

Of the three methods for producing Mo coatings, metal spraying, vapor deposition, and electro-deposition, only the first has had any commercial applications and these have been limited. Vapor-deposited coatings, by both the carbonyl and Mo pentachloride processes and electrodeposited coatings have been studied only in the laboratory. 20 ref. (L17, L23, L25; *Mo*)

395-L.* Protection of Molybdenum Against High-Temperature Oxidation. Julius J. Harwood. Paper from "The Metal Molybdenum", American Society for Metals, p. 420-461.

Most successful coating compositions that have been developed thus far center around the Ni-Cr alloy system. Both electroplated Cr-Ni layers and sprayed Ni-Cr alloys containing S and B have demonstrated a capacity to protect Mo up to about 2000° F. Sprayed mixed silicide layers also appear promising. 23 ref.
(L17, L23; Mo)

396-L. New Method of Increasing the Wear Resistance of Tracks With Open Bushings. A. A. Maurakh. *Vestnik Mashinostroeniya,* v. 36, no. 12, 1956, p. 16-18. (Henry Brutcher Translation no. 3962, Altadena, Calif.)

Merits of boronizing to give maximum wear resistance to carbon structural steel. (L15, Q9a; ST, *B*)

397-L. Heat-Resisting Hard Iron-Chromium-Nickel Facings. G. Faber. *Schweizer Archiv,* v. 23, no. 1, 1957, p. 14-19. (Henry Brutcher Translation no. 4072, Altadena, Calif.)

Previously abstracted from original. See item 224-L, 1958.
(L16; Cr, Ni, Fe, SGA-m, 2-62)

398-L. (Czech.) **Deposition of Chromium From Polychromate Baths.** Vladimir Klapka. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 101-107.

Chromium cannot be deposited from bichromate baths even if catalytic agents are used, but deposition is possible from the baths of other polychromates. Effect of the order of the polychromate and of the free chromic acid and sulphuric acid on the cathode efficiency. Effects of temperature, concentration of chromic acid and impurities (Cr_2O_3 and Fe_2O_3) on appearance of coatings from tetrachromate baths.
(L17a; *Cr*)

399-L. (Czech.) **Tin Plating of Cast Iron.** Karl Janecky. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 109-112.

The difficulties in the process and methods that facilitate the process. Explanation of formation of the tin coating on basis of the binary Fe-Sn diagram. Properties of the coating. (L17; CI, *Sn*)

400-L. (Dutch.) **Protective Coatings for Very High Temperatures.** F. Loos. *Lastekniek,* v. 24, Mar. 1958, p. 34-38.

"Rokide" flame spray method for applying a protective pure oxide coating of very high melting point.
(L27; NM-a34)

401-L. (French.) **Petroleum Bitumen for Protection of Underground Pipelines.** H. Goldstein. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 315-322.
9 ref. (L26a; 4-60)

402-L. (French.) **Thermal and Anticorrosion Insulation: A New Insulating Material Combining Both Properties.** J. F. Williams and E. A. Blackwell. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 323-326.

Gilsonite coatings for pipes carrying hot gases. (L26, 2-62; 4-60)

403-L. (French.) **Galvanizing Cast Iron.** A. Hiscock. *Fonderie Belge,* v. 28, Mar. 1958, p. 79-87.

Advantages of cast iron with high silicon (3-4%) and phosphorus (1%).
(L16; *Zn,* Cl, *P, Si*)

404-L. (French.) **Matte Formation in Galvanizing Baths.** A. Herz. *Metallurgie et Construction Mecanique,* v. 90, Mar. 1958, p. 197-199.
(L16; *Zn*)

405-L. (German.) **Application of Centrifugal Shot Descaling Plants in Bar Drawing Plants.** Fritz Kottmeier. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 358-364.
7 ref. (L10c, F27; ST, 4-55)

406-L. (Italian.) **Paints as Anticorrosive Agents.** Giampaolo Bolognesi. *Rivista di Meccanica,* v. 9, Jan. 18, 1958, p. 43-48.
(L26n, R-general)

407-L.* (Book—German.) **Costing in Electroplating.** Bernhard Gaida, Eugen G. Leuze Verlag, Saulgau, Wurttemberg. 1958, 104 p. DM 6.40.

Detailed discussion of material costs, current costs, salaries, overhead costs, value of refuse, profits and taxes. Examples include calculation for copper, nickel, chromium and silver plating. 13 ref.
(L17, A4s; *Cu, Ni, Cr, Ag*)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

Metallography

Constitution and Primary Structures

200-M. Constitution of the System Indium-Thallium-Lead, With Reference to Structural Transformations. G. V. Raynor and J. Graham. *Faraday Society, Transactions,* v. 54, Pt. 2, Feb. 1958, p. 161-173.

12 ref. (M24c; Pb, In, Tl)

201-M.* Note on Aluminum-Rich Aluminum - Manganese - Copper - Nickel Alloys. G. V. Raynor and C. R. Faulkner. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 323-324.

Metallographic examination of slowly cooled alloys, and of alloys annealed for long periods at 500° C., indicates that the ternary compounds $Ni_4Mn_{11}Al_{60}$ and $Cu_2Mn_3Al_{20}$ form a complete series of solid solutions in the quarternary system Al-Mn-Cu-Ni. (M24d; Al, Mn, Cu, Ni)

202-M. Comparison of Electron With Neutron Irradiation of Alpha Brass. A. C. Damask. *Physics and Chemistry of Solids,* v. 4, no. 3, 1958, p. 177-181.

Decrease in electrical resistivity of alpha brass which arises from increased short-range order is used as a measure of migration of excess vacancies during neutron and electron irradiation. Theoretical estimates indicate that about 14 times more vacancies are produced by the electron than by the neutron irradiation. 9 ref.
(M26s, 2-67, P15g; Cu-n)

203-M.* (French.) **Use of the Positron for Study of the Electronic Structure of Metals.** E. Daniel. *Journal de Physique et le Radium,* v. 18, Dec. 1957, p. 691-693.

It appears that the disturbance introduced with the positron may be too strong to permit much accuracy in studies of electronic structure, as screening effect obscures other phenomena. However, this technique provides an excellent pattern for study of the screening effect itself, a study which could be extended to analysis of X-ray spectra of solids. Similar problems of Knight effect in alloys are posed in field of nuclear magnetic resonance. (M25, P16f)

204-M. (German.) **Investigation of Metal Structures at High and Low Temperatures.** Rys Premysl, Bezdék Ladislav, Ciha Karel, Ruzicka Dalibor and Skarek Jiri. *Acta Technica,* v. 3, Jan. 1958, p. 58-83.

Principles and importance of high and low-temperature microscopy. Review of foreign apparatus and description of a high-temperature microscope and cooling chamber. Tests on carbon and alloy steels, cast iron and nonferrous metals and alloys. (M21c, 1-53; ST, CI, 2-62, 2-63)

205-M.* (German.) **Etching Process for the Determination of Corroison Resistant Chromium-Nickel and Chromium - Nickel - Molybdenum Steels (Stainless Steels).** Friedrich Karl Naumann and Wolfhard Carius. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 641-644.

Etching process to discriminate between stainless steels with and without Mo. Utilizes the coloring effects of an etching solution of 100 cc. HCl + 200 cc. H_2O + 30 g. $K_4Fe(CN)_6$. Another indication was $K_3Fe(CN)_6$. The steel without Mo showed many given precipitations indicating a less stable alloy. 12 ref. (M20q; SS, *Mo*)

206-M. (German.) **An Electron Microscope Method for Direct Observation of Fracture Structures.** Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 663-666.

Vaporized carbon was applied under vacuum to fractured surfaces of austenitic and ferritic steel specimens. The carbon layer is then separated electrolytically. This process destroys the structure of the fracture, but the carbon matrix obtained is of high quality and permits close observation of the crystal structure. 9 ref. (M21e; ST)

207-M.* (German.) **Equilibrium Conditions in System Iron (II) Oxide-Zirconium Oxide.** Wilhelm Fisher and A. Hoffmann. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 739-743.

System investigated at temperatures above 1300° C. by thermal analyses, microscopic and X-ray methods and slag equilibria determination. A phase diagram for temperatures betwen 1300 and 1800° C. was designed, showing that iron (II) oxide has no solubility for zirconium oxide, while zirconium oxide absorbs 3% FeO at 1800° C. and 4% FeO at 1450° C. A eutectic composition is found at 1330° C. with 3% ZrO_2. Formation and lattice structure of the crystals. (23 ref.) (M24d; Fe, Zr, 14-68)

208-M. (German.) **Submicroscopic Observations on Thin Iron Films.** Wolfgang Pitsu. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 745-752.

Extremely thin iron films were sprayed in the form of vapor on a base material under vacuum and then carefully separated. The specimens were observed under an electron microscope with penetrating beams. Some specimens were annealed at 450 to 750° C. It was found that the crystals collect in certain areas, forming crystal clusters. Thin layers along crystal boundaries are believed to be iron oxide. Depending on the thickness of the initial iron vapor film, crystal drops, crystal chains or crystal layers are formed within seconds at 600° C. 29 ref.
(M26n; Fe, 14-62)

209-M.* (German.) **Methods for Observation of Metal Surfaces, From Straight Beam Microscopy to Contrast-Interferometry.** H. Arndt. *Metall,* v. 11, Oct. 1957, p. 864-868.

Normal microscopy requires etching, which gives sufficient resolution of image; frequently, however, it affects the microstructure of the surface. A double prism, put into the beam of a microscope, modulated the complex amplitude of the light reflected from the object. Height differences of less than 20 angstroms can now be observed. Thus electrolytic polishing could be used instead of etching. The results are demonstrated on electrolytic copper and alpha brass (33% Zn). 10 ref. (M21, 1-53)

210-M. (German.) **Electron Microscope Studies on the Fabrication of Gold Foil.** E. Bruche and K. J. Schulze. *Metall,* v. 12, Jan. 1958, p. 21-27.

After the last heating process, gold foil permits flow of electrons, so its structure (a net of rectangles) can be seen with the help of an electron microscope. Defects such as perforations caused by base metals (zinc, iron, etc.) can be observed. 8 ref. (M21e; Au-b, 4-56)

211-M.* (German.) **Investigation of System Aluminum-Zinc Decomposition, Size Change, Hardness Diagram and Resistance to Upsetting.** E. Pelzel. *Metall,* v. 12, Mar. 1958, p. 197-201.

Experiments with Al-Zn alloys containing various amounts of Zn. With Zn content above 79% the concentration of beta crystals and of solid solution changes slightly above 275° C. Annealing at 300° C. produces two-phase structure. Alloy with 61.4% Zn consists, at temperature just below decomposition point, of 62% beta crystals (21% Al) and 38% beta-prime crystals (66% Al). (M24b; Al, Zn)

212-M. (Russian.) **Investigation of Metallic Structure With Electron Microscope by Use of Carbonic Impressions.** A. V. Smirnova and G. A. Kokorin. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1446-1448.

(M21e, M20r)

213-M.* X-Ray Study of Faults in Body-Centered Cubic Metals. O. J. Guentert and B. E. Warren. *Journal of Applied Physics,* v. 29, Jan. 1958, p. 40-48.

Effect on X-ray diffraction pattern of deformation faults and twin faults occurring at random on the (211) planes of a b.c.c. lattice. In single crystal reflections, deformation faults produce peak shifts and peak broadening, and twin faults produce a peak asymmetry and peak broadening. For a powder pattern it is necessary to average over the different components of a powder-pattern peak; the peak shifts average cut to zero, and the peak asymmetries to a quantity which is generally too small to measure. Both types of fault produce a line broadening which varies strongly from one powder peak to another. 14 ref. (M22f, M26s, Q24c)

214-M. Energy-Band Structure of a Hypothetical Carbon Metal. Russell C. Casella. *Physical Review,* v. 129, Jan. 1, 1958, p. 54-60.

29 ref. (M26r; C)

215-M. Distortion of the Lattice Around an Interstitial, a Crowdion, and a Vacancy in Copper. Ludwig Tewordt. *Physical Review,* v. 109, Jan. 1, 1958, p. 61-68.

A general method for calculating lattice distortions around point defects is proposed. Atoms in a sufficiently large region I around the defect and in a "boundary" region II around region I are treated as discrete particles. A set of proper elastic solutions is joined to the displacements of the atoms in region II. The equilibrium state of the lattice is determined by successive solution of sets of linear algebraic equations. Actual calculations have been done with the help of the Illiac digital computer for an interstitial, a crowdion, and a vacancy in copper. 26 ref. (M26; Cu)

216-M. Preferred Orientations Predictable in Alpha Uranium. C. Fizzotti. *United Kingdom Atomic Energy Authority,* 304/MR/157, Jan. 1957, p. 3-13. (Translation from *Energia Nucleare,* v. 3, 1956, p. 102-112.)

Plastic deformation causes, in a polycrystalline aggregate, certain orientations of crystallographic planes and directions, depending on the particular type of deformation imposed. It is then said that the aggregate has assumed a deformation texture. The textures caused

by fixed deformations in one phase of uranium, the most interesting phase from the point of view of metallurgy, orthorhombie alpha uranium are forecast. 7 ref. (M26c; U)

217-M. (English.) **On the Application of a Variational Principle to Binary Alloys in the Ising System.** I. A. Kvasnikov. *Soviet Physics, Doklady,* v. 2, no. 2, 1957, p. 158-160. (Translation by American Institute of Physics.)

(M24b, P-general)

218-M.* (French.) **Autoradiographic Proof of Preferred Self-Diffusion in Polygonization Sub-Boundaries of Alpha Iron.** Pierre Coulomb, Claude Leymonie and Paul Lacombe. *Comptes Rendus,* v. 246, Feb. 24, 1958, p. 1209-1212.

Autoradiographic study of specimen of pure polycrystalline iron into which radioactive iron was diffused at 700° C. revealed network of grain boundaries and fine intergranular network structure. Comparison with micrographic structure showed this network structure to be identical with that of polygonization subboundaries. This constitutes direct proof of preferred self-diffusion in subboundaries. (M23q, M27f, N1d; Fe)

219-M.* (French.) **Autoradiographic and Micrographic Detection of Previous Gamma Boundaries in Iron.** Pierre Coulomb. *Comptes Rendus,* v. 246, Mar. 3, 1958, p. 1421-1424.

Prior gamma boundaries can be observed after etching, heat treatment or intergranular self-diffusion. Comparison of network structures obtained shows similar influence of geometric parameters on segregation of impurities and on intergranular self-diffusion. (M23q, M27f, N1d; Fe)

220-M.* (French.) **Identification of Incipient Fatigue Cracks in Anisotropic Metals.** H. de Leiris and C. Corfa. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 101-106.

Beginning of a fatigue crack is normally identified by morphological analysis of its surface. This procedure is inadequate when material is not sufficiently isotropic; a minute examination of external path of fissure can be substituted before a complete breakdown has occurred. This highly delicate form of investigation is greatly facilitated by Jacquet-Van Effenterre replica technique. (M23, M20r, Q7, 9-72)

221-M.* (German.) **Isolation of Sulphide Inclusions and Relationship Between Properties of Steel and Inclusions.** Kurt Born. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 179-187.

Isolation of inclusions in steels by decarburizing, quenching from 700°, electrolysis, group separation. Chemical and optical properties of sulphide inclusions depending on composition of steel. Influence of Al on behavior of inclusions and properties of corresponding steel. Examination by X-ray and electron microscope. (M23; ST, 9-69)

222-M.* (German.) **Investigation of Structure of System Iron-Chromium-Carbon.** Karl Bungardt, Ernst Kunze and Elisabeth Horn. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 193-203.

Investigation of position of melting planes and four-phase planes by metallographic, dilatometric and chemical methods and also by X-ray at melting point and in solid state. Electrochemical isolation of carbides and their composition. Phase diagrams. (M24c; Fe, Cr, C)

223-M. (Russian.) **Electropolishing and Electro-Etching of Microsections of Metalloceramic Materials.** O. K. Teodorovich and E. T. Kachkovskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 57-60.

(M20p, M20q; 6-70)

224-M.* **Fractographic and Metallographic Techniques for Molybdenum and Molybdenum-Base Alloys.** W. C. Coons. Paper from "The Metal Molybdenum", American Society for Metals, p. 394-407.

Molybdenum is difficult to prepare by conventional mechanical polishing techniques because of its extreme resistance to abrasion. Suitable techniques—powder mount technique; polish-etch-buff technique; fractographic technique; electrolytic polishing technique; etching technique. 4 ref. (M20p, M20q, M23p; Mo)

225-M. **Metallographic Study of the Carbides in High-Speed Steels.** M. S. Chaadaeva. *Zavodskaya Laboratoriya,* v. 23, no. 7, 1957, p. 811-813. (Henry Brutcher, Altadena, Calif., Translation no. 4065.)

Previously abstracted from original. See item 173-M, 1957. (M26r; TS-m)

226-M. (Czech.) **Simple Extraction Replica for the Study of Fine-Grain Phases.** Jaroslav Jezek. *Hutnické Listy,* v. 13, Mar. 1958, p. 213-220.

21 ref. (M21e, M20q, M27c)

227-M. (French.) **Some New Applications of Microfractography.** J. Plateau, G. Henry and C. Crussard. *Publications de l'Institut de Recherces de la Sidérurgie,* Series A, no. 160, June 1957.

Microfractography is the examination of rupture surfaces by the electron microscope. Method permits local observation of the mode of rupture, submicroscopic inclusions and precipitates. Interesting results can be obtained even with relatively inexpensive electron microscopes of not too high a resolving power. (M21e, M23p)

228-M.* (French.) **Appearance and Stability of the Polygonized State in Pure Iron and Aluminum Crystals.** C. de Beaulieu. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 132, Apr. 1956.

Dislocations of the crystalline lattice may, at a certain temperature, be shifted and reassembled to form new boundaries within the crystal, a phenomenon called polygonization. Polygonization of the pure metal was found to occur after quenching and annealing; it represents a very stable state. Studies on large polygonized single crystals revealed new properties of very pure Fe and Al and the tendency to polygonization as a function of the purity of the metal. (M26n, M26b; Al-a, Fe-a, 14-61)

229-M.* (German.) **Investigation of Metal Structures at High and Low Temperatures. Pt. 3. High and Low-Temperature Microscopy of Steel.** Premysl Rys, Ladislav Bezdék, Karel Ciha, Dalibor Ruzicka and Jiri Skarek. *Acta Technica,* v. 3, Feb. 1958, p. 85-120.

Development and growth of austenite grains using thermal etching. Photographs of polished surfaces show cementite or ferrite segregation in relief data on martensite formation. Preliminary experiments with thermal etching on cast iron and some nonferrous metals. (M20q, 1-66, M27c, N8f; ST)

230-M.* (German.) **Disintegration of Wustite With Metallic Iron Present After Quenching to Temperatures Below 570° C.** Wilhelm Anton Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 107-113.

Wustite specimens, containing primary iron, were melted in quartz tubes under 10^{-5} Torr pressure, then annealed at 1100 or 640° C. and then quenched to temperatures between 145 and 550° C., and held there for 30 days. The lattice constant depends on the temperature and was 4.326 Angstroms between 180 and 350° C. and 4.299 to 4.300 Angstroms at 550° C. (M26, 2-64; Fe)

231-M. (German.) **Counting Tube Method With Newly Developed Specimen Retainer for the Represntation of Textures.** Johanna Grewen, Armin Segmuller and Gunter Wassermann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 115-118.

New specimen retainer which is adaptable both for the direct beam and reflection methods. Quantitative pole figures were obtained through given mathematical formulas, eliminating the necessity of calibration specimens. 14 ref. (M23c, M26c, 1-53)

232-M. (German.) **Rolling and Recrystallization Textures of an Iron-Nickel Alloy With 30% Ni.** Johanna Grewen, Armin Segmuller and Gunter Wassermann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 119-124.

In rolled plate the characteristic cubic texture was not found while in recrystallized plate the cubic texture appeared at 500° C. At increasing annealing time and temperature the cubic texture became more apparent. Another main orientation appeared in the original rolling direction. This orientation deviated from the Spinell twin orientation by 8° (angle). 30 ref. (M26c, N5; Fe, *Ni*)

233-M. (German.) **Electron Microscope Observations of Stacking Defects During Crystal Growth of Iron Nitride Films.** Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 125-128.

Iron nitride films were observed with direct beam under an electron microscope. In face-centered cubic gamma nitride layers interference images of stacking defects were obtained and their orientation in various $\{111\}$ plains is discussed. On hexagonal epsilon nitride layers no such stacking defects were found, since their formation requires too much energy. 8 ref. (M21e, M26r; Fe, 14-68)

234-M.* (German.) **On the Three-Component System Iron-Phosphorus-Zirconium.** Rudolph Vogel and Raimond Dobbener. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 129-138.

Thermal and structural investigations of the phase diagram for the system Fe-P-Zr. Two unknown three-component compositions were discovered, FeZrP and Fe_4ZrP_3, which were formed at intense heat. Both melt at temperatures above 1600° C. In the area of P and Zr-rich alloys some samples were taken to develop the ideal phase diagram to the intersection of FeP—ZrP_2 utilizing the vapor equilibria. In the concentration area Fe-FeP-ZrP_2-Zr, five ternary peritectic trans-

formations on seven ternary eutectic reactions were found. 14 ref.
(M24c; Fe, P, Zr)

235-M.* (German.) **Reaction Equilibria Between Liquid Lead and Metal Oxides. Pt. 1.** Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Feb. 1958, p. 56-63.

Experimental technique in investigation of Pb-Sb-O and Pb-As-O systems. Chemical reactions, oxidation of liquid alloys.
(M24c; Pb, Sb, As, O, 14-60)

236-M. (Russian.) **Electron-Emission Method of Investigating Steel.** K. V. Varli, K. A. Michurina and Yu. A. Skakov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1443-1446.
(M22h; ST)

237-M. (Russian.) **Electrolytic Separation of Martensite and Austenite in Tempered Steel.** V. D. Zelenova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 60-62.

4 ref. (M23, N8a; ST)

238-M.* (Book.) **Grain Boundaries in Metals.** D. McLean. 339 p. 1957. Oxford University Press, 114 Fifth Ave., New York 11, N. Y. $8.

Modern theories of grain boundaries, energies of interfaces, energy of grain boundaries, microstructure, equilibrium segregation boundaries, influence of boundaries during deformation, sub-boundaries, diffusion long grain boundaries, boundary migration, sliding at grain boundary and intergranular brittleness. Extensive bibliography. (M27f)

239-M. (Book.) **Handbook of Lattice Spacings and Structures of Metals and Alloys.** W. B. Pearson. 1044 p. 1958. Pergamon Press, Inc., 122 E. 55th St., New York 27, N. Y. $38.

A reference book containing information on structures of binary and ternary alloys, for the use of physicists and metallurgists. Contains a compilation of known X-ray work on metals and alloys in equilibrium. (M26, M24, M22)

N — Transformations and Resulting Structures

186-N. (English.) **On the Natural Aging of Quench-Tempered Steel Wire.** Masayoshi Tagaya and Yoshiro Soyama. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 309-312.
(N7a; ST, 4-61)

187-N.* (German.) **Magnetic Aging of Mild Steel.** Werner Matz and Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 655-662.

Different rimming openhearth steels were investigated as to the influence of various components such as C, P, Mn, S, Cr, N, O upon magnetic aging. Increase of coercive force after annealing at 100° C. for 600 hr. N, O and to minor degree S increase and Mn and Cr decrease the magnetic aging. P and C have no effect. 19 ref.
(N7, P16; CN, 2-60)

188-N.* (German.) **Age Hardening Copper-Titanium-Aluminum Alloy.** W. Gruhl and H. Cordier. *Metall,* v. 11, Nov. 1957, p. 928-933.

Cu-Ti alloys show very good age hardening properties, increasing the stress-strain values considerably. However, due to the affinity of Ti to oxygen, these alloys never gained wide acceptance. An addition of Al making the alloy a ternary system, prevents oxidation to a large degree. Ductility of the alloy proved satisfactory. 11 ref.
(N7a, Q-general; Cu, *Ti, Al,* 2-60)

189-N.* (German.) **Observations on the Strength Characteristics of Copper-Titanium and Copper-Zirconium Alloys.** K. Dies. *Metall,* v. 11, Nov. 1957, p. 933-941.

Cu-Ti alloys (0.26 to 4.86% Ti) and Cu-Zr alloys (0.23 to .83% Zr) were tested in order to arrive at strength characteristics necessary for their practical utilization. Solubility of Ti in Cu at 400° C. was 0.4% and at 885° C. 4.3% Ti. Age hardening characteristics are determined in relation to time, temperature and deformation. 5 ref.
(N7a, Q27a, 2-60; Cu, *Ti, Zr*)

190-N. (German.) **Influence of Silicides (of Ti, Zr, Mo, W) on the Recrystallization of Pure Aluminum.** H. Hauschka and H. Nowotny. *Metall,* v. 12, Jan. 1958, p. 6-12.

18 ref. (N5; Al-a, AD-p)

191-N. (German.) **Improvement of Al-Al_3Fe Eutectic.** H. Spengler. *Metall,* v. 12, Mar. 1958, p. 201-204.

Some properties of the alloy, especially its resistance to corrosion, can be improved by transforming coarse-grained structure into fine-grained. Experiments performed with rapid cooling, superheating and addition of various metals. Positive results obtained only by rapid cooling. 12 ref.
(N5, R-general, Q-general; Al-b)

192-N. (Russian.) **Investigation of Effect of Tension and Deformation on Self-Diffusion of Iron.** T. I. Gudkova, V. S. Gorbatov, S. Z. Bokshtein, A. A. Zhukhovitskii and S. T. Kishkin. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1438-1439.

9 ref. (N1d, Q24, Q27a; Fe)

193-N.* **Dendritic Segregation of Manganese in Steel Ingots.** R. G. Ward. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 337-342.

The degree of dendritic segregation of Mn in subcritically annealed Ni-Cr steel ingots determined by autoradiography. Manganese is concentrated between the dendrites, and maximum and minimum concentrations of 0.49% and 0.33% have been found in a nominally 0.40% Mn steel. High Mn contents are generally accompanied by high hardness, and maximum and minimum microhardness values of 243 and 161 D.P.N. have been found.
(N12b; AY, *Mn,* 9-69)

194-N.* **Effect of Tantalum and Niobium on the Tempering of Certain Vanadium and Molybdenum Steels.** Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 343-350.

Study of the carbides formed during the tempering of several simple V and Mo steels, in which the onset of secondary hardening can be directly related to the precipitation of V_4C_3 and Mo_2C by use of electron microscopic and electron diffraction methods. Small additions (0.05 to 0.25%) of Ta and Cb have considerable influence on the secondary hardening characteristics of these steels. 11 ref. (N7, N8a, 2-60; AY, *Ta, Cb, V, Mo*)

195-N. **Strain Aging Hydrogen Embrittlement in Alpha-Beta Titanium Alloys.** Harris M. Burte. *Society of Rheology, Transactions,* v. 1, 1957, p. 119-151.

Hydrogen contamination in the alpha-beta class of Ti alloys leads to a very pronounced strain rate sensitivity of the ductility of these materials, and to low stress, premature fracture under sustained tensile loading (creep). Effects of strain rate, hydrogen concentration, temperature, stress concentrations, alloy composition, and microstructure. 15 ref. (N7e, Q26s; Ti-b)

196-N. **Effect of Plastic Deformation on the Speed of Diffusion.** A. A. Presniakov. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 512-513. (Translation by American Institute of Physics.)

Experiments to estimate influence of the state of the metal lattice on the mobility of atoms of various elements through it. 7 ref. (N1a, Q24)

197-N. **Looking Inside Stainless Ingots.** J. C. Fulton and R. H. Henke. *Steel,* v. 142, Feb. 17, 1958, p. 132-134.

Study of solidification by examining the as-cast structure of some ferritic and austenitic stainless alloys. (N12, M27c; SS, 5-59)

198-N.* (French.) **Formation of Temper Carbon in Steels and White Cast Irons.** Jacques Pomey, Robert Lafont and Louis Abel. *Comptes Rendus,* v. 246, Feb. 17, 1958, p. 1044-1046.

In extra hard steels which have been tempered and quenched, then graphitized, each martensite platelet is capable of producing a monocrystalline graphite platelet, which confirms the phenomena of cohesion and epitaxy. Hence, activation energy of growth of graphite appears to be energy of self-diffusion of iron, both in alpha state and gamma state. (N8s, P13a; ST, CI-p)

199-N.* (French.) **Effect of Rapid Cooling on Growth of Aluminum Monocrystals.** H. Latiere. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 145-165.

Report of preliminary experiments indicating differences in results of continuous annealing and successive anneals. Via macroexamination and a method of X-ray study which permits examination of entire specimen, effects on grain growth resulting from annealing after quenching of quenching temperature and speed, time elapsing between quenching and anneal, quenching distortions. It is thought that vacancies solidified by quenching congregate in cavities, forming a "string of beads" in front of dislocations, which are consequently obstructed. (N3, 2-64; Al)

200-N. (Russian.) **Reducing Nonmetallic Inclusions in Molten Steel.** D. S. Gerchikov. *Metallurg,* Jan. 1958, p. 15-17.

Use of radioactive isotopes to investigate causes for inclusions.
(N12, D9, 1-59, 9-69; ST)

201-N. (Russian.) **Investigation of Mechanism of Transformation of Pearlite Into Austenite.** G. T. Fomin. *Zavodskaya Laboratoriya,* Jan. 1958, p. 56-57.
(N8h)

202-N. (Russian.) **Microstructural Investigation of Phase Changes in Metalloceramic Systems During Heating.** Ya. G. Davidovich and K. V. Kononova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 62-63.
(N6, 2-62; 6-70)

203-N. (Russian.) **Criteria for Determination of Depth of Cementite Layers.** E. G. Perel'man. *Zavodskaya Laboratoriya,* Jan. 1958, p. 65-67.
(N8, ST)

204-N.* Growth Conditions for Equiaxed Crystals in Aluminum-Magnesium Alloys. T. S. Plaskett and W. C. Winegard. *American Society for Metals, Transactions,* Preprint no. 77, v. 51, 1957, 15 p.

Breakdown from columnar growth to equiaxed growth for Al-Mg alloys was found to be dependent upon the rate of solidification, the temperature gradient in the liquid ahead of the solid-liquid interface, and the solute concentration. It is suggested that constitutional supercooling ahead of the dendritic interface promotes nucleation in the melt. 7 ref. (N12; Al, *Mg*)

205-N.* The Solubility of Hydrogen in Magnesium. J. Koeneman and A. G. Metcalfe. *American Society for Metals, Transactions,* Preprint no. 78, v. 51, 1957, 15 p.

Solubility between 550 and 775° C. determined using a modified Sieverts apparatus. The Mg is contained in a thin-walled envelope of iron to prevent evaporation and consequent attack on the silica tube. Small pressure differences develop across the iron envelope; these have been measured and used to correct the solubility readings to 1 atm. pressure. Corrected solubilities in cc. of hydrogen per 100 g. of Mg are 31 at 640° C.; 46.5 at 675° C.; 60 at 725° C.; and 63 at 775° C. 7 ref. (N15d; Mg, *H*)

206-N.* Aging Characteristics of Hastelloy B. R. E. Clausing, P. Patriarca and W. D. Manly. *American Society for Metals, Transactions,* Preprint No. 79, v. 51, 1957, 9 p.

Aging characteristics were studied in the range from 1100 through 1650° F. for periods ranging from 100 to 1000 hr. Microstructures and hardness data. Short-time tensile data obtained at room temperature and at the temperature of aging are correlated to the microstructure. Precipitation occurs at all of the temperatures investigated. (N7b; Ni-b, SGA-h)

207-N. Influence of Alloying Elements on Hydrogen Content and Hydrogen Mobility in Steel. Yu. A. Klyachko and T. S. Izmanova. *Stal',* v. 17, no. 6, 1957, p. 507-511. (Henry Brutcher, Altadena, Calif., Translation no. 4047.)

Effect of Ti, Si, C, Mn and Zr on hydrogen content of as-cast and as-forged steel specimens and on rate of hydrogen effusion (mobility). (N1, 2-60, H, ST, *C, Mn, Si, Ti*)

208-N. Device for Direct Growing of Crystals From High-Reactivity Metal Powders. D. A. Petrov and Yu. M. Shashkov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, May 1957, p. 102-103. (Henry Brutcher, Altadena, Calif., Translation no. 4074.)

Device for the fusion of highly reactive metals in powder form without the use of a crucible, and with avoidance of any interaction between metal and gaseous phase as well as any contamination of the metal by the material of the heating unit. Single crystals of Si produced. (N3r; Si, 6-68)

209-N. (Czech.) **Structural Stability of 12% Chromium-Tungsten-Molybdenum-Vanadium Steels.** J. Koutsky, J. Neid and J. Jezek. *Hutnické Listy,* v. 13, Mar. 1958, p. 119-206.

Delta ferrite appears besides sorbite in the structure in the refined state with a higher content of tungsten. 21 ref. (N8, N7; ST, *Cr, W, Mo, V*)

210-N.* (Czech.) **Carbide Reactions in Molybdenum Steels.** Josef Cadek, Bernard Fleischer and Karel Mazanec. *Hutnické Listy,* v. 13, Mar. 1958, p. 206-212.

Reactions at 650° C. during tempering of martensite, isothermal decomposition of austenite and long-term heating of decomposition products. Mo_2C often forms in the austenite decomposition as part of a special eutectoid; Mo_2C forms in the martensite decomposition of steel with 0.38% C and 3.8% Mo. (N8; AY, *Mo*)

211-N.* (Czech.) **Phase Analysis of Joints Obtained in Resistance Welding of Unalloyed and Low-Alloy Carbon Steels.** Ivan Hrivnak. *Hutnické Listy,* v. 13, Mar. 1958, p. 233-241.

All phases have a lamellar structure. Cementite lamellae in the pearlite are spaced from 10 to 1 micron; distances of carbide lamellae in the troostite and sorbite are from minimum to 0.1 micron. Chromium carbides in carbon-rich, low-alloy chromium steel have grained substructure. Decarburization and spontaneous diffusion of carbon into austenite with final diffusion on gamma-grain boundaries was found. 24 ref. (N8, K3; CN, AY)

212-N.* (German.) **Influence of Extrusion Effect on Strain Hardening of a Heat Treatable Aluminum-Copper-Magnesium Alloy.** H. Richter and G. Wassermann. *Aluminium,* v. 34, Apr. 1958, p. 193-199.

Extrusion effect is an irregularity of mechanical properties with abnormally high strength and yield point and reduced elongation in the extrusion direction, and low values transverse to the extrusion direction; the effect is textural. Brittleness of extruded specimens, which prevents necking, persists during natural aging, but disappears during artificial aging. Extrusion effect also occurs when there is recrystallization in homogenization, provided extrusion texture is preserved. 16 ref. (N7e, Q24g; Al-b, Cu, Mg)

213-N. (German.) **Iron-Nickel-Cobalt Alloys for Glass-Metal Welding.** Horst Hermann and Hans Thomas. *Zeitscrift für Metallkunde,* v. 48, Nov. 1957, p. 582-587.

Tracing of alpha-gamma phase transformation in five alloys by polarization optical method and by measurement of the electrical resistance. (N6p, M21g, K11a; Fe, Ni, Co)

214-N.* (Russian.) **Composition and Structure of Decarburizing and Transition Zones in Tempered Cast Iron.** K. I. Vashchenko and N. A. Golovan. *Liteinoe Proizvodstvo,* Mar. 1958, p. 16-20.

Observations on cast iron which was annealed at various temperatures in air. Diffusion of P, Mg, Cr and Mn into transition zone which has pearlitic structure and decreases plasticity of metal. Carbides in transition zone have a higher heat resistance than the free cementite. (N8, N1, 2-64; CI)

P Physical Properties

181-P. Calculation of Forging Cooling Rates. D. P. Timo and R. M. Goldhoff. *American Society of Mechanical Engineers,* Paper no. 58-SA-4, June 1958, 11 p.

9 ref. (P11k, F22, 4-51)

182-P. Viscosity and Density of Liquid Metals. Shashanka S. Mitra. *Physica,* v. 24, Feb. 1958, p. 155-156.

Equation for the temperature dependence of the coefficient of viscosity of Ca and Sn. 3 ref. (P10a, P10f; Ca, Sn)

183-P.* (French.) **Thin Ferromagnetic Films. Electrical Properties of Thin Deposits of Nickel.** Guy Goureaux and Antoine Colombani. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 741-744.

Experimental study of electrical conductivity of Ni deposits on W filament shows influence of thickness of deposit on electrical resistance. (P15g; W, *Ni*, 14-62)

184-P.* (French.) **On Variations of the Optical Properties of Very Thin Films of Silver When Exposed to Air.** Jean Trompette. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 753-756.

Thin films of Ag mounted on transparent base were prepared by evaporation in vacuo and reflectivity and transmissivity were measured. Specimens were then transferred to ordinary atmosphere and new measurements were taken. (P17a, P17c; Ag, 14-62)

185-P. (French.) **Note on the Coupling of the Electrons of a Metal by Anti-Parallel Spin Pairs and the Theory of Supraconductivity.** Jacques des Cloizeaux. *Comptes Rendus,* v. 246, Feb. 10, 1958, p. 904-906.

(P15, P16)

186-P. (French.) **Note on the Electrical Properties of Very Thin Films of Silver.** Clement Uny and Nicolas Nifontoff. *Comptes Rendus,* v. 246, Feb. 10, 1958, p. 906-909.

Deviations from Ohm's law. (P15; Ag, 14-62)

187-P.* (French.) **Anomalies of Resistivity in Certain Magnetic Metals.** P. G. de Gennes and J. Friedel. *Physics and Chemistry of Solids,* v. 4, No. 1/2, 1958, p. 71-77.

Anomalous resistivity of some rare earth metals and of alloys such as AuMn and Au_2Mn is studied by assuming a connection between conduction electrons and atomic spins. Magnitude of corresponding coss-section is treated as a phenomenological quantity. At high temperatures, atomic spins are at random and conduction electrons have a finite mean free path. At low temperatures, atomic spins are all aligned and no scattering can occur. Short-range order effects in the spin lattice are analyzed in the Born approximation and shown to be small in most physical situations. 16 ref. (P15g; SGA-n)

188-P. (German.) **Potential Oscillations in Iron and Zinc Electrodes Submerged in Sulphuric Acid.** Hans Ludering. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 625-632.

Theoretical explanation and resulting differential equation. 20 ref. (P15; Fe, Zn)

189-P.* (German.) **Utilization of Thermomagnetic Analysis for the Observation of Transformation Properties of Iron Alloys Between −150 [°C] and + 1500 [°C].** Rudolf Kohlhaas and Heinrich Lange. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 645-653.

The phase transformations of Fe and its alloys can be observed and investigated by utilizing the magnetic susceptibility of these substances in the paramagnetic as well as the ferromagnetic range. The behavior in extremely high and low temperatures is observed in a chamber with a built-in permanent mag-

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

net. The chamber can be evacuated and pressurized. Diagrams showing the magnetic susceptibility in dependence of the temperature clearly indicate the phase transformations (Curie points) for various alloys. 12 ref. (P16, N11; Fe-b)

190-P. (German.) **Effect of Alloy Additions on Conductivity of Metals.** F. Pawlek and K. Reichel. *Metall,* v. 12, Jan. 1958, p. 1-6.

Electric resistance of a pure metal can be increased by alloying. Some 142 values for increased resistance, arranged in tables or shown in graphs. 55 ref. (P15g, 2-60)

191-P. (Russian.) **Study of Radioactivity of Nonmetallic Inclusions in Steel During Electrolysis.** M. I. Tsekhanskii, N. I. Shishkina and K. B. Khusnoyarov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1440-1442.

7 ref. (P18; ST, 9-69)

192-P. (Russian.) **Conditions for Demagnetizing Samples of Transformer Steel.** V. V. Druzhinin and Yu. A. Lazarev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1451-1454.

(P16; ST, SGA-n)

193-P. Aluminum Piston Alloys in Germany. Herman Kessler. *Light Metals,* v. 21, Mar. 1958, p. 85-88. (From Technical Report no. 28 of the Aluminumwerke Nürnberg G.m.b.H.)

Technical and physical characteristics of eutectic hypereutectic alloy and hypo-eutectic Al-Si alloys with especially high Si content. (P-general, Q-general, T17, 17-57; Al)

194-P. Properties of Silicon Doped With Iron or Copper. C. B. Collins and R. O. Carlson. *Physical Review,* v. 108, Dec. 15, 1957, p. 1409-1414.

Both Fe and Cu introduce deep levels into the forbidden band of Si which are observable by electrical and optical measurements. 26 ref. (P15, P17; Si, *Fe, Cu*)

195-P. Temperature Dependence of the Magnetic Susceptibility of Alpha-Silver-Zinc Alloys. Lothar Meyer and Dan Weiner. *Physical Review,* v. 108, Dec. 15, 1957, p. 1426-1427.

Magnetic susceptibility measured from 5-35% Zn between room temperature and helium temperatures. All samples became slightly more diamagnetic with decreasing temperature, and any temperature-dependent paramagnetic contribution to the susceptibility due to bound electron states must be less than 0.1% of the room-temperature value of the susceptibility. 9 ref. (P16, 2-61; Ag-b, Zn-b)

196-P. K-Emission Spectrum of Metallic Lithium. D. E. Bedo and D. H. Tomboulian. *Physical Review,* v. 109, Jan. 1, 1958, p. 35-40.

The emission spectrum of an evaporated Li target investigated in spectral region extending from 60 to 600 A. The intensity distribution of the characteristic K-emission was determined photometrically. 18 ref. (P17d; Li)

197-P.* Normal and Superconducting Heat Capacities of Lanthanum. A. Berman, M. W. Zermansky and H. A. Boorse. *Physical Review,* v. 109, Jan. 1, 1958, p. 70-76.

The heat capacities of three samples of La measured in the temperature range 1.6 to 6.5° K. A four-constant formula was found which represented the resistance-temperature relation of the carbon composition resistance thermometer from 1.6 to 7.2° K. Two superconducting transitions were found in each sample: one at 4.8° K. and the other at 5.9° K. These are associated respectively with the hexagonal close-packed and face-centered cubic modifications of the metal. (P12r; La)

198-P. On the Spectral Characteristics of the External Photoelectric Effect from an Activated Copper-Magnesium Alloy. V. N. Lepeshinskaia and G. A. Iudaev. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 450-454. (Translation by American Institute of Physics.)

5 ref. (P15k, P17e; Cu-b, Mg-b)

199-P. Study of the Thermal Conductivity of Lead Telluride. E. D. Deviatkova. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 414-418. (Translation by American Institute of Physics.)

Study of a material that can be used in development of thermoelectric batteries, and to examine question of possible mechanisms of thermal conductivity in semiconductors. 5 ref. (P11h; Pb-b, EG-j45)

200-P. Iron-Silicon Alloys With Orientated Structure. Fritz Assums, Richard Boll, Dieter Ganz and Friedrich Pfeifer. *Zeitschrift für Metallkunde,* v. 48, June 1957, p. 341-349. (Iron and Steel Institute, Translation no. 712.)

Previously abstracted from original. See item 342-P, 1957. (P16r, 3-72; Fe, Si)

201-P. (French.) **New Observations on the Role of Adsorbed Oxygen in Modifications of the Equilibrium Profile of Metallic Surfaces at High Temperatures.** Jacques Benard, Jean Moreau and Finn Gronlund. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 756-758.

(P13d; O)

202-P. (French.) **Allowable Current Capacities in Bars and Sections Made of Aluminum and Aluminum Alloys.** Pierre Chapoulie and Rene Rols. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 87-95.

Calculation of current capacity of Al and Al alloy (A-GS) bars and sections by mathematical formula. (P15g; Al)

203-P.* (Italian.) **Research on Copper-Chromium-Silicon and Copper-Cobalt-Silicon Alloys Having High Electrical Conductivity.** Sergio Gallo. *Metallurgia Italiana,* v. 50, Jan. 1958, p. 15-19.

Study of suitability of two heat treatable Cu alloys for manufacture of resistance welding electrodes. Addition of Si to Cu-Cr alloys assures complete deoxidation during manufacture; proper amounts of Si provide Brinell hardness and electrical conductivity comparable to tht of electrolytic Cu, and a recrystallization temperature above 500° C. Si can be substituted for Be in Cu-Co-Be alloys with equally good results. Crystal structure of silicides formed in both cases (cubic for Cu-Cr-Si system, orthorhombic for Cu-Co-Si) studied. 12 ref. (P15g, Q-general, M26, W29h, 17-57; Cu-b, *Cr, Si, Co*)

204-P.* New Stainless Steel to Beat Heat Barrier. *Materials in Design Engineering,* v. 47, May 1958, p. 104-105.

Report on a modified 18-8 steel which can be formed soft then hardened by heat treatment. New steel has coefficient of thermal expansion considerably below 18-8, excellent resistance to corrosion, stress-corrosion cracking, and is easily welded. (P11g, R-general, Q-general; SS)

205-P. Metallurgical Aspects of Semi-Conductors. John Pratt. *Metal Industry,* v. 92, Apr. 11, 1958, p. 287-289.

Brief summary of six papers presented at a Symposium of the Metal Physics Committee of the Institute of Metals. (P15; EG-j31)

206-P.* (German.) **Optical Properties of Iron Oxide Smoke.** W. Pepperhoff and Cord Passow. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 77-82.

Radiation of converter flames is determined experimentally and represented in diagrams in dependence of time. The radiation originates from the optical properties of iron oxide smoke. The radiation curves indicate a maximum of radiation near the end of the blowing operation. 15 ref. (P17, D3b; Fe, 14-68)

207-P. (Russian.) **Differential Magnetic Ballistic Method for Measurement of Paramagnetic Phases.** Ya. I. Kagan and Yu. I. Pascal. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1455-1456.

(P16p, 1-53)

208-P. (Russian.) **Method to Determine Sealed Porosity and Defects in Metallic Structure.** B. V. Lukin and V. G. Nagornyl. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1458-1461.

Quantitative method based on comparison of specific weights as determined by X-ray and pycnometer. (P10m, M27, 1-53)

209-P. (Russian.) **Method of Constructing Actual Characteristics of Materials During Uniaxial Elongation and Contraction.** K. K. Likharev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1472-1477.

4 ref. (P10d)

Q Mechanical Properties and Tests

400-Q. Aluminum in Rolling Stock Impact Tests at Collision Speeds. R. A. Campbell, J. G. Sutherland, J. F. Whiting and R. A. Kemp. *American Society of Mechanical Engineers,* Paper no. 58-RR-1, Apr. 1958, 13 p.

(Q6s, T23p; Al)

401-Q. Properties Affecting Suitability of 9 Per Cent Nickel Steel for Low-Temperature Service. T. N. Armstrong, J. H. Gross and R. E. Brien. *American Society of Mechanical Engineers,* Paper no. 58-MET-3, Apr. 1958, 9 p.

Charpy values for both keyhole and V-notch specimens reported for test temperatures down to −320° F. (Q6; AY, *Ni,* 2-63)

402-Q. Solid Lubricant Coatings. L. M. Berry. *American Society of Mechanical Engineers,* Paper no. 58-AV-20, Mar. 1958, 27 p.

Quantitative data on some of the variables affecting the performance of dry-film lubricants. The tests, made on a Falex lubricant tester, show that optimum performance can be obtained only if the variables affecting their use are known and taken into account. (Q9; NM-h)

403-Q. Survey of the Mathematics Available for Describing Fracture. A. E. Scheidegger. *Canadian Journal of Physics,* v. 36, Mar. 1958, p. 300-308.

10 ref. (Q26, M26b)

404-Q.* **Selection of Steels for Springs.** H. J. Elmendorf. *Metal Progress,* v. 73, Apr. 1958, p. 80-84.

Mechanical properties of spring wire and springs; by knowing the wire tensile strength, the spring design stress can be predicted and the proper spring steel can be selected. (Q21, Q23b, Q27a; ST, SGA-b)

405-Q.* **Tear Test for Titanium Sheet.** C. W. Vigor and J. R. Hornaday, Jr. *Metal Progress,* v. 73, Apr. 1958, p. 103-107.

Small coupons are torn by a conventional tensile testing machine. The amount and duration of applied force are recorded and used to determine the work required for tearing. Resulting data measure effect of hydrogen embrittlement and thermal instability.
(Q26q, Q26s, 1-54; Ti, *H*)

406-Q. (German.) **Determination of Notched-Bar Toughness Using Small Test Specimens.** Vladimir Komarek. *Acta Technica,* v. 3, Jan. 1958, p. 26-57.
(Q6)

407-Q.* (German.) **Testing Devices and Testing Procedures for Extended Creep of Steel Subjected to Elevated Temperatures.** K. G. Olsson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 679-685.

A testing device was designed which resulted in a homogeneous distribution of stresses in the specimens. The elongation was measured and recorded accurately with gages. (Q3, 1-53)

408-Q. (German.) **Results of Extended Creep Tests on Ferritic and Austenitic Steels Subjected to Elevated Temperatures.** André Constant. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 695-702.

Creep tests in France on a large number of steels conventionally used for high-pressure steam pipes, for steel castings and for large forgings. (Q3; ST)

409-Q.* (German.) **Results of Creep Tests on Material for Steel Pipes. Determination of Design Characteristics Such as Tensile Strength.** Fritz Eberle. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 702-706.

Temperatures between 455° C. and 980° C. were chosen for the tests and the time was up to about 40,000 hr. The previous heat treatment was varied as to hardening temperatures, quenching and annealing conditions. The strain-time curves on some steels show a distinctive bend at a certain point, indicating a structure transformation. Unless rupture occurred the curves remain straight thereafter in double logarithmic representation.
(Q3, Q27a, 17-51; SS, SGA-h)

410-Q.* (German.) **Development of High-Temperature Steels and Their Testing in Czechoslovakia.** Jaroslav Pluhar. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 707-710.

Creep tests were carried out at 550° C. on steel castings (0.1% C, 0.5% Cr, 0.8% Mo, and 0.1 to 1.5% Ni) and (0.1% C, 0.5% Cr, 0.8% Mo, 0.25% V), and (0.1 to 0.6% Ni). The steel was hardened at 1100° C., quenched in oil and annealed at 720° C. for 6 hr. Notched and unnotched specimens were investigated. In tests up to 20,000 hr., no disadvantageous effects of the Ni content were observed. The embrittlement of Ni steels formerly observed and a frequent cause of rejection can be attributed to improper heat treatment. 30 ref.
(Q26s, 2-60, 2-64; AY, SGA-h, 5-60)

411-Q.* (German.) **Variations of Creep Velocity in a Carbon Steel Subjected to Creep Tests.** Axel Johansson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 712-715.

On a normalized carbon steel with 0.16% C the creep curve was recorded at 450° C. up to 21,000 hr. The creep velocity was derived from the creep curve and plotted in a diagram. The velocity curve is of an irregular shape and does not lend itself for extrapolation for longer times. Annealing at 600° C. did not show more satisfactory results. (Q3; CN)

412-Q.* (German.) **Scattering of Results of Extended Creep Tests at Elevated Temperatures.** Wilhelm Schlüter. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 717-719.

Samples of Cr-Mo pipe steel were taken from different steel mills and different heats and subjected to creep tests up to 40,000 hr. at 550° C. The scattering of results amounted to $\pm 20\%$ about the mean. Therefore, it may be advisable for design purposes to give the mean as the main characteristic and also the maximum observed deviations. This eliminates the troubles of testing each individual heat.
(Q3, 1-54; SS)

413-Q.* (German.) **Creep Tests With Small Specimens and Their Evaluation.** Alfred Keller and Werner Stauffer. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 719-726.

For large-scale creep test, space and furnace requirements became excessive. Therefore, a small specimen was developed and a large number of tests were carried out on low and high-alloy steels (12 to 25% Cr, 8 to 20% Ni, 3% Mo and 7% Co). The results for the same alloy but from different heats were represented on stress-time diagrams, showing the disposition range and on the lower boundary the minimum requirements. 6 ref.
(Q3, 1-60; AY, SS)

414-Q.* (German.) **Statistical Evaluation of Results From Extended Creep Tests at Elevated Temperatures as a Means for the Determination of Minimum Requirements.** Hans Zschokke. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 726-730.

Statistical evaluation methods were applied on 200 samples of steel (3% Cr, 0.6% Mo, 0.3% V, 0.5% W) subjected to stresses of 30, 22 and 20 kg. per sq. mm. at 550° C. Means, standard deviations and confidence ranges were calculated. Tests on single specimens can be extremely unreliable, and short-time tests should be conducted on a large number of specimens from the same material. (Q3, 1-54, S12)

415-Q.* (German.) **Observations on Electrically Conductive Rubber Models. Useful for the Explanation of Processes Occurring in Strained Metals.** W. Spath. *Metall,* v. 11, Oct. 1957, p. 859-863.

Measurement of electric conductivity and its variation on rubber models. Internal stresses in microscopic areas observed and explained through molecular rearrangements, indicating similar phenomena in metals. Behavior under static and periodic loads was recorded by electric means permitting much finer observations than the mechanical instruments conventionally used. 4 ref. (Q25, 1-54)

416-Q. (German.) **Creep Tests on Brass.** H. Vosskuhler. *Metall,* v. 11, Nov. 1957, p. 944-945.
(Q3; Cu-n)

417-Q. (German.) **Influence of Surface Structure on Forming Properties of Metals. Pt. 2.** H. Wiegand. *Metalloberflache,* v. 12, Mar. 1958, p. 65-68.

Oxide films, diffusion coats (carburizing and nitriding), deposition coats (electrolytic deposits, weld deposits, plating). Structure and influence on forming properties.
(Q23q, 3-71, 8)

418-Q. (Russian.) **Wear Resistance of Iron Particles.** O. A. Nesvizhskii. *Liteinoe Proizvodstvo,* Jan. 1958, p. 5-6.

Study of microstructure of iron particles cast by various means such as in earthen molds, stationary chill casting, vibration and centrifugal methods so as to determine their resistance to cracking and abrasion. 6 ref. (Q9n, M27; CI)

419-Q. (Russian.) **New Low-Alloy Structural Steel.** I. S. Kozlovskii. *Vestnik Mashinostroeniya,* Feb. 1958, p. 6-10.

The addition to medium-carbon structural steel of 0.002-0.005% boron in the form of ferroboron increases its strength to the point where it can replace many more expensive, high-alloy steels. 5 ref. (Q-general; AY, *B*)

420-Q. (Russian.) **Effect of Sulphur in Fuel on Wear of Diesel Parts.** M. S. Smirnov. *Vestnik Mashinostroeniya,* Feb. 1958, p. 34-36.
4 ref. (Q9, R7k, W11j)

421-Q. (Russian.) **Increasing Durability of Cutting Tools During Grinding by Cooling Under High Pressure.** A. V. Pakhomov. *Vestnik Mashinostroeniya,* Feb. 1958, p. 55-56.
(Q9n, T6n, 2-63, 3-74)

422-Q. (Russian.) **Wear Resistance of Enamel Coated Machine Parts.** V. S. Lomakin and V. I. Savchenko. *Vestnik Mashinostroeniya,* Feb. 1958, p. 64-66.
(Q9, T7, 8-71)

423-Q. (Russian.) **Increasing Wear Resistance and Lengthening Service of Machinery.** D. A. Draigor. *Vestnik Mashinostroeniya,* Feb. 1958, p. 81-82.
(Q9n, T7)

424-Q. (Russian.) **Investigation of Location of Plastic Deformation During Creep Under Conditions of Intense Strain.** I. A. Oding and G. A. Tulyakov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1478-1480.
5 ref. (Q24, Q3)

425-Q. (Russian.) **Determination of Elastic Limit and Yield Point of Thin Spring Wire During Torsion.** K. G. Galimkhanov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1485-1488.
5 ref.
(Q7, Q21a, Q27a, Q1, T7c; 4-61)

426-Q. (Russian.) **Determination of Fatigue Limit.** V. S. Ivanova and L. K. Gordienko. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1489-1492.
(Q7)

427-Q. (Russian.) **Verification of Testing Methods of Wear-Resistant Qualities.** V. A. Shevchuk. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1492-1494.
(Q9n)

428-Q. (Russian.) **Determination of Internal Tensions in Galvanized Coatings.** Sh. Z. Zakirov and Yu. N. Petrov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1495-1496.
(Q25; *Z*, 8-15)

(*)**Articles Available Through Photocopy Service; See Coupon, p. 59.**

429-Q.* **Effects of Cold Rolled Threads on the Properties of High Temperature Chromium-Molybdenum Steel Threads.** J. W. Jenkins, W. L. Williams and J. L. Herring. *Bureau of Ships Journal,* v. 6, Feb. 1958, p. 7-12.

Room-temperature tension tests and elevated-temperature creep relaxation tests were performed on Cr-Mo steel bolt studs to compare the effects of cut threads and cold rolled threads. The thread rolling produced a significant reduction in proof stress which could largely be recovered by stress relief. The yield strength was not similarly affected, at least to any large extent. The relaxation properties were independent of the threading procedure and of the stress-relief treatment used to improve the proof stress. The results indicated that the yield strength had gretaer utility than the proof test for specification acceptance testing.
(Q27, Q3a, G12; AY, *Cr, Mo*)

430-Q. **Camera Shows How Parts Burst at High Speeds.** R. H. Eshelman. *Iron Age,* v. 181, Apr. 17, 1958, p. 116-118.

Camera records exact instant Ti jet engine compressor wheel flies apart. (Q7, X5j, T24b; Ti)

431-Q.* **Use of Paraffin Wax as a Model Material to Simulate the Plastic Deformation of Metals. Pt. 2. Practical Applications of This Technique.** J. W. Barton, C. Bodsworth and J. Halling. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 321-331.

Use of paraffin wax for study of several metal forming operations. Close correlation obtained between theoretical and practical conditions for direct extrusion with lubricated and rough dies. A wide range of practical friction conditions can be obtained by suitable choice of the deforming surfaces. Effects of extrusion temperature gradient in the billet. Technique extended to the deformation of material passing through a commercial rolling mill. 17 ref. (Q23q, F23, F24, 17-56)

432-Q.* **How Grinding Affects Fatigue Strength.** L. P. Tarasov. *Metalworking Production,* v. 102, Feb. 21, 1958, p. 323-327.

Recent studies show that good commercial grinding practice does not lower fatigue limit despite high tensile stresses. Severe grinding caused some drop in fatigue limit. When grinding oil was used, surface was strengthened enough to raise the fatigue limit. High residual tensile stresses were associated with smaller drop in fatigue limit. Residual grinding stresses were not reduced measurably as a result of fatigue testing. Fatigue limits of all hardened steels are likely to benefit from the cold working of the surface, during grinding. 8 ref.
(Q7a, G18; ST)

433-Q.* **Creep of Aluminum-Copper Alloys During Age Hardening.** E. E. Underwood, L. L. Marsh and G. K. Manning. *National Advisory Committee for Aeronautics,* Technical Note 4036, Feb. 1958, 73 p.

Interrelation of aging during creep and creep during aging studied in polycrystalline Al alloys containing 1 to 4% Cu. Experimental procedures included interrupted creep tests, tensile tests of creep specimens, quantitative metallographic determination of precipitation during creep, hardness measurements on unstressed and stressed aged alloys, X-ray studies of deformation in the crystalline lattice, and microscopic examination of the surface deformation markings. 40 ref. (Q3, N7a; Al-b, *Cu*)

434-Q. **Mechanism of Boundary Lubrication and the Properties of the Lubricating Film. Short and Long-Range Action in the Theory of Boundary Lubrication.** B. V. Deryaguin, V. V. Karassev, N. N. Zakhavaeva and V. P. Lazarev. *Wear,* v. 1, Feb. 1958, p. 227-290.

Two versions of the blow-off method, by which the dependence of the viscosity of oils and other non-volatile fluids on the distance from the solid wall can be measured, and the viscosity localized with an accuracy of 10 Å. Mechanical properties of the boundary lubrication layer explain both the existence of static friction and the observation of the two-term friction law derived from the molecular theory of friction. 28 ref. (Q9, NM-h)

435-Q. **Extreme-Pressure Lubricating Properties of Some Sulphides and Disulphides, in Mineral Oil, as Assessed by the Four-Ball Machine.** W. Davey and E. D. Edwards. *Wear,* v. 1, Feb. 1958, p. 291-304.

Disulphides are superior to monosulphides as extreme-pressure additives; mechanism of action of these compounds. 14 ref.
(Q9, 18-73, NM-h)

436-Q. **Wear of Metals.** F. T. Barwell. *Wear,* v. 1, Feb. 1958, p. 317-332.

Phenomena associated with rolling contact, scuffing, fretting, corrosion, simple sliding with and without oxygen. Examples of practical cases. 14 ref. (Q9)

437-Q. **Review of the Friction of Solids.** F. P. Bowden. *Wear,* v. 1, Feb. 1958, p. 333-346.

31 ref. (Q9p)

438-Q. **Deoxidation and Technological Characteristics of Killed Basic Converter Steels. Pt. 1. Deoxidation Process as Well as Aspect and Composition of Deoxidation Products. Pt. 2. Inclusions, Degree of Purity and Mechanical and Technological Properties.** Erin Plockinger and Rupert Rosegger. *Stahl und Eisen,* v. 77, May 30, 1957, p. 701-714; June 13, 1957, p. 798-804. (Iron and Steel Institute, Translation no. 667.)

Previously abstracted from original. See item 724-Q, 1957.
(Q27a, Q5g, Q6n, D11r; ST-c, 9-69)

439-Q.* (Czech.) **Study of the Dynamic Impact Test.** Ales Vetiska and Antonin Till. *Hutnické Listy,* v. 13, Jan. 1958, p. 37-42.

Deformation characteristics of dynamically stressed material are obtained by piezo-electric transmission of sudden forces with the oscillograph. Calculations based on permanent deformation of test rods submitted to impact show that the development of dynamic forces dependent on deformation is similar to that obtained with the oscillograph, the calculated forces being higher. 7 ref. (Q6, 1-54)

440-Q. (French.) **Brinell Hardness of Castings.** J. Van Eeghem. *Fonderie Belge,* v. 28, Feb. 1958, p. 58-60.

(Q29, 5-60)

441-Q.* (French.) **Research on Hot Deformation of Steels. Pt. I. Development of Variable-Speed Hot-Torsion Testing Machine. Hot Torsion Tests; First Results.** C. Rossard and P. Blain. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 174, Oct. 1957, 88 p.

Specimens of 0.25% carbon steel, 18-8 stainless and 25% Cr steel were tested in specially designed apparatus to provide experimental data for theories of plasticity at recrystallization temperatures and to establish relationships between composition and structure of steel, load, speed of deformation, type of deformation and temperature. 22 ref.
(Q1, 1-53, 1-66; ST)

442-Q. (French.) **Study of Metallic Parts. Strength of High Pressure Vessels.** R. Epain. *Metallurgie et la Construction Mécanique,* v. 90, Feb. 1958, p. 97-105.

Cylinder was submitted to enough pressure to create permanent deformation. (To be continued.)
(Q24, 3-74, T26q)

443-Q.* (French.) **Relationships Between Sub-Zero and Hot Brittleness in 18-8 Stainless Steels.** Andre Gueussier and René Castro. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 107-122.

Carbide precipitations caused by tempering of austenitic steels are accompanied by brittleness at low temperatures and by a shift of impact-temperature curves toward higher temperatures. Analysis of this embrittlement reveals characteristics of these precipitations when steels contain Ti or Cb. Embrittlement at high temperatures is observed. Precipitates responsible for embrittlement can occur during course of deformation, and kinetics of their formation depends largely on composition and prior heat treatment of steels. 21 ref.
(Q26s, 2-62, 2-63; SS)

444-Q. (French.) **Dynamic Calibration of Fatigue Testing Machines.** J. Kalbfleisch. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 166-178.

(Q7, 1-53, S23)

445-Q.* (German.) **Effect of Gas and Salt Bath Nitriding on Properties of Structural Steels. Pt. 2.** H. Wiegand and M. Koch. *Metalloberfläche,* v. 12, Apr. 1958, p. 97-101.

Investigation on steels C 35, C 60, 16 MnCr 5, 34 Cr 4, 34 CrAl 6. Experimental conditions; results; fatigue fracture.
(Q-general, 2-64, J28k; AY)

446-Q. (Russian.) **Determination of Modulus of Elasticity of Sheet Metal.** S. O. Tsobkallo and Z. A. Bashchenko. *Zavodskaya Laboratoriya,* Jan. 1958, p. 68-70.

6 ref. (Q21a; 4-53)

447-Q. (Russian.) **New Method of Investigation of Deformation of Metals.** N. I. Skryabin. *Zavodskaya Laboratoriya,* Jan. 1958, p. 82-83.

4 ref. (Q24, 1-54)

448-Q. (Russian.) **Fatigue Testing of Tempered Steel.** I. E. Kolosov. *Zavodskaya Laboratoriya,* Jan. 1958, p. 90-91.

(Q7; ST)

449-Q. (Russian.) **Determination of Fatigue in Cable Wires During Asymmetric Cycle.** M. S. Bel'mes. *Zavodskaya Laboratoriya,* Jan. 1958, p. 117-118.

(Q7, T1b)

450-Q.* **Steels at Elevated Temperatures With Special Reference to the Use of Molybdenum.** J. D. Murray. *Alloy Metals Review,* v. 9, Mar. 1958, 8 p.

Requisite properties for elevated temperatures including corrosion resistance, weldability, tensile strength, fatigue strength, creep resistance and high-temperature ductility. Effect of Mo on creep strength and ductility. Microstructure of alloy

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

steels and mechanism by which Mo imparts properties. 8 ref.
(Q-general, R-general, K9s, 2-62, 2-60; AY, *Mo*)

451-Q. High Strength Parts. Jack Doelker. *Ordnance,* v. 42, Mar-Apr. 1958, p. 916-917.

Properties of parts produced from electrolytic iron powders by pressing, sintering and carburizing.
(Q-general; Fe, 6-72)

452-Q. Effect of Fabricated Edge Conditions on Brittle Fracture of Structural Steels. L. A. Harris and N. M. Newmark. *Welding Journal,* v. 37, Apr. 1958, p. 137s.
(Q26s; ST, SGB-a)

453-Q.* Proposed Procedure for Testing Shear Strength of Brazed Joints. F. M. Miller and R. L. Peaslee. *Welding Journal,* v. 37, Apr. 1958, p. 144s-150s.

Requirements for design of standard shear tests specimens, test procedure and test evaluation in determining tensile shear strength of brazed joints. 14 ref.
(Q2g, 1-60; 7-52)

454-Q.* Ductility and Energy Relations in Charpy Tests of Structural Steels. J. H. Gross and R. D. Stout. *Welding Journal,* v. 37, Apr. 1958, p. 151s-159s.

Relationship of energy absorption in V-notch Charpy impact test to notch ductility. Evaluates ductility by measuring lateral expansion produced during deformation at side of specimen opposite notch. Influence of tensile strength on energy absorption and lateral expansion of ASTM alloys A203, A212, A285, A302, A387, and 48s5 HT HY65, T1, C-1032 steels. Use of lateral expansion data for determining ductile-to-brittle transition temperature. 18 ref.
(Q6, Q23s, Q23p; ST, SGB-a)

455-Q.* The Behavior of Molybdenum Single Crystals Under Various Stress Conditions. R. Maddin. Paper from "The Metal Molybdenum", American Society for Metals, p. 214-240.

Growth of Mo single crystals; appearance of slip lines; structural changes of deformation; effect of bending on resistivity; determination of slip elements; rolling and recrystallization. 6 ref.
(Q24, N3r; Mo, 14-61)

456-Q.* Ductile-to-Brittle Transition in Molybdenum. J. H. Bechtold and E. T. Wessel. Paper from "The Metal Molybdenum", American Society for Metals, p. 241-261.

A ductile-to-brittle transition is a general characteristic of body-centered cubic metals, and the transition temperature of Mo is within the range expected as based on correlations with the melting point or, more accurately, with the modulus of elasticity. There appears to be little chance of eliminating the tendency for brittle behavior in Mo, or for greatly reducing the minimum temperature range of its occurrence by known practical metallurgical techniques. 6 ref. (Q23r; Mo)

457-Q.* Effects of Oxygen, Nitrogen, and Carbon on the Ductility of Wrought Molybdenum. H. S. Spacil and J. Wulff. Paper from "The Metal Molybdenum", American Society for Metals, p. 262-280.

Adjusting the balance of carbon, oxygen and nitrogen in commercial Mo. Vacuum annealing and zone refining for stabilizing Mo are useful only for research purposes. Of far greater practical importance is stabilization by small alloy additions of such highly reactive metals as Ti, Zr and Hf. Such additions raise the recrystallization temperature 390° F., increase the hot strength, and reduce the possibility of embrittlement in the temperature range 2730 to 3810° F. 32 ref.
(Q23p, 2-60; Mo)

458-Q.* Effects of Hot-Cold Work on the Properties of Molybdenum Alloys. R. Q. Barr, M. Semchyshen and I. Perlmutter. Paper from "The Metal Molybdenum", American Society for Metals, p. 462-510.

Molybdenum alloyed with 0.28% Cb or 0.5% Ti was strain hardened when rolled or forged at temperatures up to 2400° F. The hardness produced by a given amount of deformation varied with the deformation temperature. Provided no recrystallization occurred during deformation, the higher the working temperature in the range 1800 to 2400° F. the higher the hardness of the wrought structure. 3 ref.
(Q29n, 3-68, 2-61; Mo-b)

459-Q. Effect of Structure of Titanium-Tungsten Carbide Compositions on the Life of Tool Tips. P. K. Mikhailova. *Stanki i Instrument,* v. 28, no. 6, 1957, p. 26. (Henry Brutcher, Altadena, Calif., Translation no. 3966.)

Previously abstracted from original. See item 133-Q, 1957.
(Q23, 3-71; 6-69)

460-Q. Study of Zone Failure in Creep. I. L. Mirkin and I. I. Trunin. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 2-7. (Henry Brutcher, Altadena, Calif., Translation no. 3979.)

Previously abstracted from original. See item 37-Q, 1958. (Q3, M26)

461-Q. Service Life of Aluminized Steel Parts at High Temperatures. P. Grobner. *Hutnické Listy,* v. 10, 1955, p. 600-605. (Henry Brutcher, Altadena, Calif., Translation no. 4077.)

Previously abstracted from original. See item 34-Q, 1956.
(Q-general, L15; *Al,* ST)

462-Q.* (English.) **Ferrito-Pearlitic Steels for the Construction of Steam Turbines.** R. Pokorny, T. Buzek and T. Kermes. *Czechoslovak Heavy Industry,* no. 2, 1957, p. 22-29.

Results of creep relaxation, fatigue and corrosion tests on ferrito-pearlitic steels of Czech formulation including Skoda T56, HDT, TBW 50, TBMO 50, HDM, TBV40, and N10.
(Q3, Q7, R-general, W11k, 17-57; ST)

463-Q.* (Czech.) **Ductility Evaluation of Steels Cast in Vacuum.** Vladimir Hasek. *Hutnické Listy,* v. 13, Mar. 1958, p. 221-226.

Ductility of steels cast in the usual way, those cast under vacuum and those exposed to vacuum during and after casting was tested with equipment intended for torsion testing. Vacuum cast steel, owing to its fine-grained structure and less developed dendritic structure in the as-cast state, has better ductility even at higher degree of forging than cast steel in the usual way.
(Q23p, D8m; ST)

464-Q. (Czech.) **Properties of Wrought Iron After Service in Railway Bridges.** Jaroslav Sorm. *Hutnické Listy,* v. 13, Mar. 1958, p. 226-230.

Tests on old material used for bridge construction show that strength values are satisfactory when stressed in tension. 7 ref.
(Q23, Q25, T26p; 17-57; Fe-m)

465-Q. (Dutch.) **Copper and Copper Alloys. Pt. 17.** W. G. R. Jager. *Metalen,* v. 13, no. 5, 1958, p. 92-96.

Tabulated results of microhardness measurements made on an English plastic bronze (6% Sn, about 3.5% Pb), an American plastic bronze (agreeing in composition with the German bronze MSnBz4Pb, DIN 17662), a Ni-Al cast bronze (11% Al, some Mn and Fe), and a Ni-Al plastic bronze (9-10% Al, 1-3% Ni, several % Fe). (Q29q; Cu-s)

Corrosion

265-R. Some Basic Corrosion Research at NBS. *Industrial and Engineering Chemistry,* v. 50, Mar. 1958, Pt. 1, p. 55A-56A.
(R4; Cu)

266-R. Crystal Growth Theory for Stress Corrosion Cracking. *Industrial Heating,* v. 25, Apr. 1958, p. 696-698.
(R1e, M26r)

267-R. (French.) **Kinetics of Growth of the Surface Film Formed by Oxidation of Iron in Steam at High Temperatures.** Jean Paidassi and David Fuller. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 759-761.
(R2q; Fe)

268-R.* (German.) **Corrosion of Metals With Incomplete Coatings.** H. J. Engell. *Archiv für das Eisenhuttenwesen,* v. 28, Nov. 1957, p. 753-760.

Porous coatings of corrosion products such as hydroxides, oxyhydrates and carbonates, commonly referred to as rust, develop through electrolytic precipitation or through direct growth on the metal surface. This coat can be a corrosion preventing influence when it develops a cathodic protection for the base metal. The corrosion process on oil tankers and explanations of local pitting. 16 ref. (R1, R10d, R2j)

269-R.* (German.) **Formation of Flakes on Copper Wires.** E. Lindau. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 504-509.

"Flakes" are the tiny Cu particles adhering but not bonded to the surface of Cu wires. To obtain quantitative estimate of flake formation a certain amount of wire was washed with trichlorethylene under ultrasonic excitation. Reasons for the flake formation were oxide formation during heating in oxidizing atmospheres; surface roughness of the wire during drawing; Cu grades with oxide inclusions. 3 ref. (R1h, S15; Cu, 4-61)

270-R. (Russian.) **Electrochemical Investigation of Corrosion During Comparative Moisture in Atmosphere of 100% and Less.** Yu I. Mikhalovskii and I. D. Tomashov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1462-1466.

7 ref. (R3, R11m)

271-R.* Tantalum as a Corrosion Resistant Material. F. G. Cox. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 44-48.

Tantalum is resistant to most acids and liquid metals at elevated temperatures but readily attacked by hydrofluoric acid and alkalies. Properties of the metal and effect of chemicals. 11 ref. (R6g, R6m; Ta)

272-R. Corrosion of Car Bodies. K. A. Murrell. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 49-54.

Corrosion of car bodies controlled by design improvement, improved metals and finishes, new materials.
(R-general, T21a)

273-R. Survey of Corrosion in Packaging. Pt. 2. D. V. Weatherley. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 59-61.

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

Metal components can be protected by vapor phase inhibitors (also known as volatile corrosion inhibitors). In addition, polyethylene packs and specially treated papers have been developed. (R10e, R10b)

274-R.* **Corrosion of Steel. Pt. 1. Protective Action of Oxides of Lead and Zinc.** A. K. Choudhury and S. C. Shome. *Journal of Scientific and Industrial Research,* v. 17A, Jan. 1958, p. 30-34.

Results of corrosion tests and electrode potential measurement made to evaluate the protective action of aqueous extracts of pigment and paint coating on steel specimen subjected to corrosion under water. Action of aqueous extract made from dried oil paints consisting of mixtures of lead oxide and/or zinc oxide with linseed oil; protective properties of similar mixtures used as coatings. 9 ref.
(R11, L26n, L14a; ST)

275-R.* **Corrosion of Steel. Pt. 2. Inhibitive Behavior of Chromates, Molybdates and Tungstates of Zinc and Lead.** A. K. Choudhury and S. C. Shome. *Journal of Scientific and Industrial Research,* v. 17A, Jan. 1958, p. 35-38.

Study of corrosion inhibitive properties of zinc chromate, zinc molybdates, zinc tungstate, red lead, lead chromate, lead molybdate, and lead tungstate. Evaluates extracts made from a dried paint containing the above pigment and linseed oil. 11 ref. (R10b; ST)

276-R. **Mass Transfer in Liquid Metal Circuits.** A. Draycott. *United Kingdom Atomic Energy Authority,* 342/MR/157, Jan. 1957, 10 p.

Mass transfer of stainless steel constituents in a NaK circuit occurs to an appreciable extent. The amount transferred is dependent upon oxide level and temperature of the system. 4 ref.
(R2a, T11; 14-60)

277-R. (French.) **Determination of Corrosion Resistant Properties of Castings at Various Temperatures.** P. Detrez. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 374-382.

Users should be very specific about working conditions and temperatures in ordering "refractory castings" and foundrymen should be explicit about the qualities of their castings. Causes for poor performance or cracking are graphitization, internal stresses (thermal), corrosion, fusion of phosphorus eutectic. Corrosion causes are variety of structural constituents, diversity of gas composition, different penetration speeds of gases into casting masses.
(R-general, E-general, 5-60, 9-72)

278-R. (French.) **Corrosion Phenomena in Tubular Condensers.** A. J. Maurin. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 383-393.

Prevention through inhibition with potassium permanganate; cathodic protection; chlorination. (To be continued.)
(R4, R10b, R10d, R10g; Cu, ST, 4-60)

279-R. (French.) **The Fight Against Corrosion. Role and Future of Sintered Products. Pt. 1. Powder Metallurgy.** R. Meyer. *Nature,* no. 3275, Mar. 1958, p. 104-107.

(To be continued.)
(R10b, H-general)

280-R.* (French.) **Experimental Conditions for H_2S Corrosion Cracking Tests. Influence of Structure of Mild and Low-Alloy Steels on Their Life in H_2S Under Stress.** E. Herzog. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 123-144.

Comparison of H_2S corrosion cracking phenomena resulting from variety of bending and tensile tests. Factors influencing failures. Investigation facilitated choice of satisfactory steel for piping used at only natural gas deposit in France, where gas has a 15% H_2S content. 8 ref.
(R11s; CN, AY)

281-R* (German.) **Speed of Scaling of Pure Iron in Oxygen at Diminished Pressures and in Carbon Dioxide.** Norbert G. Schmahl, Hans Baumann and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 147-152.

Velocity of scaling of electrolytic iron at 950° and at varying pressures. A linear relationship is found at lower pressures, a parabolic at higher pressures. Annealing of iron in pure carbon dioxide at 950° produces fine crystalline scale; no definite conclusions can be given on scaling regularity. Velocity of scaling is greater with increasing oxygen pressure. (R2q, 3-74; Fe-a)

282-R.* (German.) **Corrosion Behavior of Artificially Produced Hard Zinc Coats.** W. Rädeker. *Metalloberfläche,* v. 12, Apr. 1958, p. 102-104.

Composition and some properties of Zn-Fe alloyed coat; heat treatment. Corrosive effect of atmosphere on treated coat in laboratory and in natural conditions; optimal treatment temperature; limited application of method in practice.
(R3, J-general; *Zn*)

283-R.* (Italian.) **Corrosion of Metals at High Temperature by Vanadium Anhydride. Behavior of Alloys Containing Titanium.** A. Burdese and S. Gallo. *Metallurgia Italiana,* v. 50, Jan. 1958, p. 8-14.

Test pieces of Cr, Co and Ni alloys containing Ti were subjected to attack at 700° C. in air and V_2O_5-saturated room for periods of 300 hr. Micrographic and X-ray studies were made of structure of materials used, of mechanism of formation, thickness and constitution of oxide films formed. Presence of Ti improves resistance to hot oxidation in presence of V_2O_5. Observed improvement is related to high stability and thickness of protective film. However, addition of Ti to Ni alloys must be limited as it causes excessive brittleness. 36 ref.
(R6p, 2-62, 2-60; Cr, Co, Ni, *Ti*)

284-R.* (Italian.) **Zinc Powder and Zinc Oxide Base Anti-Rust Paints.** Giancarlo Ghisolfi. *Pitture e Vernici,* v. 13, Dec. 1957, p. 833-842.

Anti-rust protection provided by mixtures of Zn powder and Zn oxide in paints with chemically inert bases and oily bases evaluated by salt spray tests and measurement of electrical potential and voltage in corrosion cells. Films produced by paints studied were applied to inert bases, then investigated for permeability, ease of absorption of solutions, possibilities of reaction with electrolytes. Paints with zinc powder-zinc oxide bases in chemically inert vehicle and having composition very similar to that of a Zn-rich paint develop efficient anti-rust action. 5 ref. (R11; NM-g30)

285-R. **Service Blistering of Plated Zinc Alloy Die-Castings.** V. E. Carter and J. Edwards. *Metal Industry,* v. 92, Mar. 1958, p. 191-192.

(R2n, 5-61; Zn-b, 8-62)

286-R. **Cast Stainless Pump Handles Corrosive Electrolytes.** E. A. Schoefer. *Plating,* v. 45, Apr. 1958, p. 366-367.

(R6, W13d, 17-57; SS)

287-R. (Czech.) **Effectiveness of Cathodic Protection of Sprayed Metal Coatings (Anodes) in River Water.** M. Svoboda, K. Kolar and B. Knapek. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 107-109.

(R10d, R4a, 8-67; Zn, Al, Mg, 8-67)

288-R. (French.) **Relation Between the Intensity of the Cathodic Protection Current and the Intensity of the Stray Current Circulating in Metallic Underground Pipes.** S. Minc and Z. Feldblum. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 308-314.

(R10d; 5-60)

289-R. (French.) **Special Pipe for Lacq Gas Fields.** A. Madrelle. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 327-330.

Tubing made of special steels (Mn, Mo; Cr, Al, Mo) to resist corrosion by H_2S. (R6g; ST, 4-60)

290-R. (French.) **Determination of Thickness Reduction of Sheet Metals and Steel Pipes Caused by Corrosion.** M. G. Pirou. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 339-347.

Different procedures to determine corrosion including photographic, television, acoustic, ultrasonic, radiographic, electric and magnetic methods. Magnetic is recommended as best. (R11, S14; ST, 4-53, 4-60)

291-R. (French.) **Determination of the Properties of Corrosion Resistant Castings at Different Temperatures.** P. Detrez. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 374-382.

A table of principal characteristics of castings relative to such conditions as temperature at which utilized, whether machined or not, whether under large or small strains, and whether required to withstand thermal shocks.
(R2, 2-61, 5-60)

292-R. (French.) **Study of the Intercrystalline Corrosion of 18-8 Stainless Steel by Observation of Internal Friction.** M. Smialowski and W. Drozd. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 394.

(R2h; SS)

293-R. (French.) **Corrosion Test Methods.** W. Wiederholt. *Corrosion et Anticorrosion,* v. 6, Mar. 1958, p. 80-100.

Following types of tests were conducted: exposure to humidity at a constant temperature and at a variable temperature between 20 and 40° C., at a variable temperature in an atmosphere of SO_2 or CO_2, immersion in saline mist, alternate immersion in 3% NaCl solution.
(R11j, R11q)

294-R.* (French.) **Study of Intercrystalline Corrosion by Hydrochloric Acid of Very High-Purity Aluminum and Aluminum Purified by the Zone-Melting Technique.** F. Montariol. *Corrosion et Anticorrosion,* v. 6, Mar. 1958, p. 101-106.

Influence of the state of purity of the metal on the selective corrosion at grain boundaries of very high-purity Al in hydrochloric acid. Corrosion is slower for metal of the higher purity, and is accelerated by certain additives (ethyl alcohol) to the attacking agent. 13 ref.
(R6g, R2h; Al-a)

295-R.* (German.) **Influence of Temperature Upon the Development of Scale on Pure Iron Exposed to Oxygen.** Norbert G. Schmahl, Hans Bau-

mann and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 83-88.

A new method for the precise determination of constants in the scaling process of pure iron between 480 and 1080° C. 34 ref. (R2q, 2-62; Fe-a)

296-R.* (German.) **Periodic Dissolution of Iron in Soils. Atmospheric Corrosion in Presence of Hydrogen Chloride.** P. Kirkov. *Werkstoffe und Korrosion,* v. 9, Mar. 1958, p. 146-149.

Changes of periodic dissolution are indicated by maximum and minimum solubility curves. Changes are caused by hydroxide layers as corrosion products. Process tends toward a state of equilibrium between acid diffusion and metal dissolution. A new protective layer can result from solubility of the hydroxide layer in the mineral acids. Velocity and mechanism are determined. 9 ref. (R8, R3; Fe)

297-R. (German.) **Corrosion Current-pH Value Diagram of Lead in Dilute Electrolytes.** T. Markovic and V. Bestvina. *Werkstoffe und Korrosion,* v. 9, Mar. 1958, p. 152-154.

Velocity of Pb dissolution in pH range of 1-13. 18 ref. (R1a; Pb-a)

298-R. (Rumanian.) **Qualitative Research on Corrosion Protection Afforded by Protective Coatings.** M. Ciortea. *Petrol si Gaze,* v. 9, Jan. 1958, p. 37-42. (R11, L26)

Inspection and Control

204-S.* **Steel Heat Treatment Quality Control. Pt. 1. The Quality Control Plan.** Konrad Kornfeld. *Canadian Metalworking,* v. 21, Mar. 1958, p. 24, 26, 28.

Consideration of material quality, furnace temperatures, quenching and supervision of personnel to maintain standards of a steel product. (S-general; J-general; ST)

205-S.* **Quality Control in Cupola Melting.** R. A. Short. *Canadian Metalworking,* v. 21, Mar. 1958, p. 30, 32, 34, 36, 38.

Statistical quality control records for each day establishes a trend which can be used to determine control limits in iron smelting. (S12, E10a)

206-S.* **Automatic Gauge Control in Rolling Mills.** R. B. Sims. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 289-302.

Theoretical background of automatic gage control. Installations of the Davy-United/B.I.S.R.A. system on reversing and tandem mills, and some other types of control operated from thickness gages, and maintaining strip thickness by varying either the position of the mill screws or the applied strip tension. Economics of the controller. 15 ref. (S14, X20c, W23p, 1-52)

207-S.* **Accuracy of Strip-Thickness Measurement by Beta and Gamma Absorption.** E. B. Bell. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 303-309.

Fundamental and operational accuracy limitations, with particular reference to statistical variations, detector sensitivity variations, electronic drift, movement of absorber and variation of these errors over the range of the instruments. 4 ref. (S14e, 4-53)

208-S.* **Measurement, Inspection, and Automatic Process Control in the Steel-Strip Finishing and Tinplate Industry.** S. S. Carlisle and J. H. Wilson. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 310-315.

Nondestructive inspection techniques developed for continuous steel strip processing lines: measurement of coating thickness by X-ray fluorescence, measurement of strip width and thickness and detection of pinholes and lamination. Need for a suitable method for continuous and objective measurement of tinplate surface quality. 11 ref. (S13, S14; ST, *Sn,* 4-53)

209-S. **Inspection of Tubes for Flaws and Variations in Thickness.** J. B. C. Robinson. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 316-322.

Fundamental aspects of eddy-current inspection with special reference to a commercial instrument—the "Introview"—and the probe design. Metallurgical and physical conditions of tubing as they affect eddy-current techniques. Use of eddy currents for inspecting condenser tubes after a period of service and for detecting flaws in tubes during production. 11 ref. (S13h, S14h; 9-71, 4-60)

210-S. **Basic Guides to Steel Quality.** *Steel,* v. 142, Apr. 28, 1958, p. 106, 109.

Use of control charts, frequency distribution and sampling to assure valve steel quality. (S12; ST)

211-S. **Spectrographic Determination of Uranium in Ores and the Products Obtained by Treatment of These Ores.** N. G. Morozova. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 183-190. (Translation by Consultants Bureau, Inc.)

6 ref. (S11k; *U,* RM-n)

212-S. **Apparatus for Determining the Content of Gases in Metals.** Z. M. Turovtseva, N. F. Litvinova, G. V. Mikhailova, A. S. Noskov and R. Sh. Khalitov. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 207-211. (Translation by Consultants Bureau, Inc.)

Gases are analyzed by passing the hydrogen evolved through a palladium filter, CO is oxidized to CO_2 and the latter condensed with liquid nitrogen, while nitrogen is determined on the basis of residual pressure. An attachment to the apparatus insures loading of the crucible without destroying the vacuum. 6 ref. (S11r, 1-53)

213-S. **Potentiometric Method of Determining Small Amounts of Barium in Nickel-Based Alloys by Means of Complexone III.** L. Ya. Polyak. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 223-227. (Translation by Consultants Bureau, Inc.)

12 ref. (S11j, Ni, *Ba*)

214-S. (German.) **Determination of Small Amounts of Titanium in Iron Alloys and Ores.** Ernst Schoffmann and Hanns Malissa. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 623-624.

9 ref. (S11a; *Ti,* Fe-b, RM-n)

215-S. (German.) **Quantitative Determination of Alloy Components in Steel by Means of X-Ray Fluorescent Spectral Analysis.** Hans Krächter and Willi Jäger. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 633-639.

(S11p; ST)

216-S.* (German.) **Spectrographic Determination of Trace Elements in Steel by Means of Agitated Electrodes.** Siegfried Eckhard and Walter Koch. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 731-738.

The sensitivity of spectrographic methods for trace elements has so far been limited through interference with other stronger spectral lines. Chemical procedure to eliminate interference requires considerable effort and time. The direct agitation of electrodes to speed volatilization of the elements increases the sensitivity and decreases the uneven distribution of trace elements in the specimen. (S11k; ST)

217-S.* (German.) **Nondestructive Testing of Metals by Means of Electromagnetic Induction Methods.** F. Forster. *Metall,* v. 11, Oct. 1957, p. 837-845.

A systematic survey of all the known eddy current testing methods and devices and their experimental evaluation. Principles of detecting defective materials (cracks, flaws, variations in composition), or of testing physical dimensions (such as electric conductivity, wall thickness, thickness of isolation layers of metal coatings). 54 ref. (S13h, S14h)

218-S. (German.) **Rapid Photometric Analysis of Titanium in Copper Alloys.** H. Wiedmann. *Metall,* v. 11, Nov. 1957, p. 942-943.

(S11a; Cu-b, *Ti*)

219-S. (German.) **Comparative Potentiometric Determination of Manganese in Copper and Its Alloys.** H. Pohl. *Metall,* v. 11, Nov. 1957, p. 947-949.

4 ref. (S11j; Cu-b, *Mn*)

220-S. (German.) **Possibilities and Limits of X-Ray Mineral Analysis of Bauxites.** Hans Ginsberg and Karl Wefers. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 499-503.

In addition to chemical analysis it is desirable to develop other reliable methods for determination of mineral forms in bauxite. As long as there is only one component present the X-ray method is sufficiently accurate. Mixtures of components do not permit quantitative X-ray detremination of the minerals, because of their different and complex crystalline orientations. (S11p; Al, RM-n)

221-S. (Russian.) **Determination of Zirconium by Amperometric Titration With Cupferron.** Yu. I. Usatenko and G. E. Bekleshova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1406-1407.

4 ref. (S11j; Zr)

222-S. (Russian.) **Colorimetric Determination of Zirconium With Phenylfluorone.** F. G. Zharovskii and A. T. Pilipenko. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1407-1410.

6 ref. (S11a; Zr)

223-S. (Russian.) **Analysis of Gases in Steel by Means of Heating in Vacuum.** Yu. A. Klyachko, L. L. Kunin, E. M. Chistyakova and N. S. Larichev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1410-1412.

4 ref. (S11r; 1-73; ST)

224-S. (Russian.) **Determination of Gases in Ferrous Metals.** Z. M. Turovtsva. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1432-1436.

A review. 29 ref. (S11r; Fe)

225-S. (Russian.) **Mass-Spectrometric Investigation of Kinetics of Separation of Gases From Metals.** V. I. Fistul. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1448-1451.

6 ref. (S11c, S11r)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

226-S. On the Estimation of Beryllium. Pt. 2. A New Rapid Gravimetric Method for Its Estimation in Beryl. Apurba Kumar Sen Gupta. *Indian Chemical Society, Journal,* v. 34, Oct. 1957, p. 725-727.

Based on a new extraction process using sodium tetrafluoborate as flux. Compares advantages of this method to others in use.
(S11b; Be)

227-S.* Determination of Arsenic in Iron and Steel. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 331-337.

Colorimetric method for the routine determination of As up to 0.03%, development of a standard method for the determination of all As contents in iron and steel. The latter is based on reduction and precipitation of As with hypophosphite and titration with iodine.
(S11a, S11j; ST, *As*)

228-S.* Betatron Speeds Non-Destructive Testing. V. Wolpert. *Metalworking Production,* v. 102, Feb. 14, 1958, p. 280-282.

Revolving Brown Boveri betatron with two beams of 31 Mev. for testing complex parts of great thickness in very short time sometimes preceded with ultrasonic echo testing on large parts for indication of defects. Relative merits of X-ray, cobalt-60 isotope and Betatron techniques. (S13e, 1-53)

229-S. Some Notes on an Attempt to Use T.T.A. in Conjunction With Chromatography for the Separation of Rare Earths. F. W. Cornish. *United Kingdom Atomic Energy Authority, Atomic Energy Research Establishment* T/M 145, June 1957, 11 p.

5 ref. (S11f; EG-g)

230-S. Mechanization of Openhearths Using Electronic Apparatus. P. G. Baranovskii and Ya. S. Pinus. *Metallurg,* Feb. 1958, p. 15-17. (Iron and Steel Institute Translation no. 927.)

Use of electronic devices to develop more effective interconnection between various control mechanisms and more precise control of temperature. (S18, S16, W18r, 18-74)

231-S. (French.) **Micro-Analyzer for Determination of Very Small Gas Samples.** A. Blondel. *Fonderie,* v. 144, Jan. 1958, p. 19-24.

10 ref. (S11r)

232-S. (French.) **Spectral Analysis of Metals.** *Machine Moderne,* v. 12, Mar. 1958, p. 57-63.

Study of spectral radiations, spectral analysis, apparatus standardizing, spectroscopes and spectrographs. (To be continued.) (S11k)

233-S. (German.) **Use of Infrared Spectroscopy in Determining Mineral Components of Slag and Heat Resistant Systems.** Werner Pepperhof. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958; p. 153-158.

Infrared absorption spectra measured between 6 and 14 μ. Small specimens (about 1 mg.) were prepared by potassium bromide press technique (pressure up to 600 kg. per sq. cm.) Spectra of various substances and even of the polymorphous phases have characteristic features. Method can supplement usual chemical and crystallographic determination of mineral components. (S11a, RM-q)

234-S.* (German.) **Main Accompanying Elements in Pig Iron and Their Chemical Determination.** Theo Kurt Willmer. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 159-164.

Determination of Al, Co, Cr, Cu, Mo, Ni, Ti, V, As, Sb, Sn and Pb. Accuracy of method reaches 0.0005%. (S11; CI-a)

235-S. (German.) **Measuring Specific Iron Radiation in Activated Ore.** Heinz Ramthun and Horst Scheiwe. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 165-167.

Testing stability of agglomerate by measuring iron radiation in blast furnace dust using radioactive labeling of test agglomerate. Experimental technique, preparation of specimens, measuring technique and accuracy. Iron dust exhaust from hard foamed sinter is 4.5% from briquettes 13.5%.
(S19, A8a; Fe, RM-n)

236-S.* (German.) **Photometric Determination of Iron in Pure Tin and Tin Melts Used for Tinning Sheet Steel.** Heinrich Ploum. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 169-172.

Recently developed photometric method for determining small amount of iron using thioglycolic acid. Optic behavior of iron-thioglycolic-acid solution. Estimation of calibration curve. Influence of accompanying substances and of hydrolysis on accuracy of method. Test technique. (S11a; Sn, *Fe*)

237-S. (German.) **Use of Proportional Counters and Impulse Height Discrimination on Counting Tube Goniometer.** Franz Bollenrath and Hans Krings. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 189-191.

Increase of line intensity compared with the one of the background using a xenon proportional counter with impulse height discrimination. Susceptibility of the apparatus in detection of impurities increased. Method requires use of chromium radiation.
(S19, X2n; 9-51)

238-S. (Italian.) **Control of Galvanizing Solutions With the Hull Cell.** Gianfranco Riboldi. *Galvanotecnica,* v. 9, Feb. 1958, p. 39-45.

(S11g, L16)

239-S. (Russian.) **Determination of Germanium in Ores, Coal and Industrial Waste Products.** V. A. Nazarenko, N. V. Lebedeva and R. V. Ravitskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 9-13.

11 ref. (S11j; *Ge,* RM-n)

240-S. (Russian.) **Complexometric Determination of Thorium.** A. I. Busev, L. V. Kiseleva and A. I. Cherkesov. *Zavodskaya Laboratoriya,* Jan. 1958, p. 13-16.

9 ref. (S11j; Th)

241-S. (Russian.) **Photocolorimetric Determination of Bismuth in Tin.** M. I. Shvaiger, V. P. Paklina and A. S. Medvedeva. *Zavodskaya Laboratoriya,* Jan. 1958, p. 16-17.

(S11a; *Bi,* Sn)

242-S. (Russian.) **Quick Method for Determination of Copper, Lead and Zinc in Metallic Ores.** S. Yu. Fainberg, A. A. Blyakhman and L. N. Filatova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 18-20.

6 ref. (S11j; *Cu, Pb, Zn,* Rm-n)

243-S. (Russian.) **Separation of Zinc and Cobalt.** Yu. V. Morachevskii and Z. S. Bashun. *Zavodskaya Laboratoriya,* Jan. 1958, p. 20-21.

(S11f; Co, Zn)

244-S. (Russian.) **Colorimetric Determination of Cementite Content of Steel.** N. M. Popova and L. V. Zaslavskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 26-29.

(S11a; ST, 14-68)

245-S. (Russian.) **Thermo-Electric Determination of Carbon in Steel During Smelting.** P. D. Korzh and A. P. Ershova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 41-43.

(S16j; ST, *C*)

246-S. (Russian.) **Radiochemical Determination of Sulphur Inclusion in Electroplated Deposits of Nickel and Copper.** A. A. Sutyagina. *Zavodskaya Laboratoriya,* Jan. 1958, p. 43-44.

6 ref. (S19; *S,* Cu, Ni, 8-62, 9-69)

247-S. (Russian.) **Quality Control of Steel Heat Treatment by Magnetic Testing.** A. M. El'gard and S. K. Ginsburg. *Zavodskaya Laboratoriya,* Jan. 1958, p. 96-101.

4 ref. (S13j; J-general; ST)

248-S.* Determination of Gases in Molybdenum. M. W. Mallett and W. R. Hansen. Paper from "The Metal Molybdenum", American Society for Metals, p. 365-392.

Sensitive and accurate apparatus for vacuum-fusion analysis of Mo for oxygen, hydrogen and nitrogen. At gas volumes less than 0.5 ml. and in the range 0.5 to 2.5 ml. to the apparatus is sensitive to a change of 0.005 ml. and in the range 0.5 to 2.5 ml. to a change of 0.01 ml. Changes of 0.0005 ml. can be detected at gas volumes of 0.05 ml. 8 ref.

(S11r, 1-53; Mo, *O, H, N*)

249-S. Comparison of Wet With Spectro-Analytical Methods for Total Aluminum in Steel. M. Lacomble and L. Dor. *Revue Universelle Des Mines,* v. 11, no. 2, 1955, p. 86-97. (Henry Brutcher, Altadena, Calif., Translation no. 3810.)

(S11b, S11k; ST, *Al*)

250-S. Experience in Nondestructive Testing of Welded Tubes. H. D. Weise. *Schweissen und Schneiden,* v. 8, no. 10, 1956, p. 355-363. (Henry Brutcher, Altadena, Calif., Translation no. 4073.)

Merits of testing welds in tubes by radiation methods, ultrasound, X-ray and gamma-ray inspection.
(S13; 7-51, 4-60)

251-S. Inspection of Castings With Radioisotopes. B. B. Gulyaev and L. G. Demina. *Liteinoe Proizvodstvo,* no. 9, Sept. 1956, p. 18-20. (Henry Brutcher, Altadena, Calif., Translation no. 4078.)

(S13e, 1-59; 5-60)

252-S.* (Czech.) **Thickness Measurment of Tin and Lead Coatings in a Radioisotope Back-Reflection Process.** Jaromir Kuba and Jaroslav Hladik. *Hutnické Listy,* v. 13, Mar. 1958, p. 230-233.

S^{35}, Tl^{204}, Sr + Y^{90}, and Ru + Rh^{106} were used to determine thickness ranges of Sn and Pb coatings. Thickness of the base material cannot be greater than the so-called final thickness. For measurement of currently manufactured Sn and Pb coatings, Tl^{204} is best among the isotopes available. 7 ref.
(S14e, 1-59; *Pb, Sn,* 8)

253-S. (French.) **Automatic Factory Inspection of Soft Steel Billets by Electromagnetic and Ultrasonic Methods.** V. Husarek and L. Beaujard. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 132, May 1957.

To insure uninterrupted movement along conveyer to rolling mill, defective billets must be eliminated. Electromagnetic and ultrasonic inspection methods can be applied for more accurate knowledge of qualities of first choice and lower grade lots, decrease in visual inspection costs, elimination of incidents in rolling due to defects, and

quality improvement of finished product. These benefits largely offset installation and operation costs of the inspection systems. (S13g, S13h; ST, 5-59)

254-S.* (German.) **Ultrasonic Testing of Aluminum Workpieces.** W. Boehme. *Aluminium,* v. 34, Apr. 1958, p. 200-205.

Convenient and robust testing rig for scanning defects inside workpieces, surface defects and testing of joints. Ultrasonic testing has advantage that mechanical millimeter waves can penetrate much further than high-frequency electromagnetic waves and thus detect finer discontinuities than with X-rays and gamma rays. 7 ref. (S13g; Al)

255-S. (German.) **Spectrochemical Determination of Phosphorus in Steel With the Phosphorus Line at 3175 Angstrom.** *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 89-94.

20 ref. (S11k; ST, *P*)

256-S. (German.) **Determination of Oxygen in Titanium.** Hans G. Lange von Stocmeier. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 95-100.

Critical review. 28 ref. (S11; Ti, *O*)

257-S. (German.) **Chromatographic Analysis of Gases. A Modern, Time-Saving Method.** W. Schuhknecht. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 101-106.

Apparatus automatically registers the components of any gas by means of the varying heat conductivity of these components. 3 ref. (S11r)

258-S.* (German.) **Industrial Suitability of Hydrochloric Acid Test for Differentiating Converter and Openhearth Steels.** E. Rubo. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 165-169.

Basic principles; experimental technique and effect of its modifications. Advantages include low expense, saving in time, relatively high reliability. (S10a; ST-e, ST-g)

259-S. (Hungarian.) **Technology of Producing Dynamo and Transformer Sheets. Pt. 3.** Neuhöffer Ernö. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 6-10.

(S-general, S22; ST, SGA-n, 4-53)

260-S. (Japanese.) **Determination of Magnesium in Aluminum Alloys by Photometric Titration.** Teruyuki Kanie. *Japan Analyst,* v. 6, Nov. 1957, p. 711-715.

(S11a; *Mg,* Al-b)

261-S. (Japanese.) **Determination of Nonmetallic Inclusions in Iron and Steels by Iodine Method.** S. Malkawa and M. Ebihara. *Japan Analyst,* v. 6, Nov. 1957, p. 715-719.

(S11; ST, 9-69)

262-S. (Japanese.) **Photometric Determination of Titanium in Metallic Aluminum and Its Alloys.** Yoshiyo Kakita, Minora Hosoya and Minoric Amano. *Japan Institute of Metals, Journal,* v. 21, Aug. 1957, p. 501-503.

Use of sodium alizarinsulphonate and stannous chloride in acidic solution of hydrochloric acid. (S11a; *Ti,* Al-b)

263-S. (Russian.) **New Method of Determining Stannic Sulphide in Ores.** L. V. Zverev and N. V. Petrova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1403-1405.

Advantages of using carbon tetlochloride instead of acidic solution. 6 ref. (S11j; *Sn,* RM-n)

264-S. (Russian.) **Accelerated Method of Isolating the Carbide Phase in Steel.** O. S. Spiridonova and T. I. Bezuglova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1412-1413.

Use of electrolysis, with specimen in solution of 50% caustic soda, reduces time from 6 or 8 hr. to 40 min. (S11g; ST)

265-S. (Russian.) **Ultramicro Analysis.** I. P. Alimarin and M. N. Petrikova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 29-32.

Literature review. 47 ref. (S11d)

266-S.* (Book.) **Radioisotopes.** Sidney Jefferson. 110 p. 1958. Philosophical Library Inc., 15 East 40th St., New York 16, N. Y. $4.75.

Industrial applications include radioactive markers; detection of leaks; thickness measurements; levels and density gages; radiography and autoradiography; static discharge and ionization; fission products. Elementary fundamentals of radioactivity-atomic structure; health precautions. (S-general, 1-59, P18, A7r; 14-63)

T Metal Products and Parts

176-T. Are Tool Steels the Answer to High-Speed Flight? Joseph H. Mainhardt and John P. Wright. *American Machinist,* v. 102, Mar. 10, 1958, p. 106-110.

Preliminary design data on formability, machinability, decarburization control, and heat treatment of hot-work H-11 (5 Cr-Mo-V) toolsteel in both sheet and bar form. Its projected use is for aircraft structures which must meet the basic requirements of strength and temperature resistance. (T24a, 17-57; TS)

177-T. Ceramic Tools Gather Momentum. *American Machinist,* v. 102, Apr. 21, 1958, p. 122-124.

(T6n, G17; 6-70)

178-T. Boron-10, New Atomic Material Available for Commercial Use. *Inco,* v. 27, Dec. 1957, p. 24-26.

Refining and production of B^{10} by reaction of boron trifluoride and di-methyl ether, distillation of the complex, followed by electrolysis. (T11, C-general, 17-57; Ni-b, B)

179-T. Beryllium Research. *Metal Industry,* v. 92, Mar. 28, 1958, p. 255-256.

Research on Be as a possible fuel-canning material. Toxic properties demand stringent precautions. (T11g, 17-57, A7q; Be)

180-T.* Cermets in Jet Engines. J. W. Graham and W. F. Zimmerman. *Metal Progress,* v. 73, Apr. 1958, p. 108-111.

Despite the extensive experimental work in the last ten years, cermets, because of their inherent low impact strength, have not proved suitable for jet engine components. Since substitutes with the needed properties have become available, research work on cermets is now confined to basic principles. (T7h, 17-57; SGA-h, 6-70)

181-T. Nylon-Clad Sleeve Bearings. D. L. Penney and F. J. Bockhoff. *Product Engineering,* v. 29, Mar. 3, 1958, p. 52-54.

(T7d, 17-57; NM-d, 8-66)

182-T. Production of Ball and Roller Bearings. Methods Employed by the Hoffmann Manufacturing Co., Ltd. *Machinery (London),* v. 92, Apr. 4, 1958, p. 779-782.

(T7d, G-general)

183-T. Tungsten Carbide Lamination Die. *Machinery (London),* v. 92, Apr. 4, 1958, p. 783-784.

(T6r; 6-69, W)

184-T. Economies Obtained by Using Extruded and Die Cast Aluminum Parts. Herbert Chase. *Machinery (London),* v. 92, Apr. 4, 1958, p. 798-800.

(T21b, 17-57; Al, 4-58, 5-61)

185-T. Exotic Metals Seek Employment. Annesta R. Gardner. *Product Engineering,* v. 29, Mar. 17, 1958, p. 66-70.

Gallium, indium, bismuth, beryllium, chromium, vanadium, hafnium, columbium and rhenium for special structural and electrical problems requiring special properties. (T1, T26, 17-57, Q-general; Ga, In, Bi, Be, Cr, V, Hf, Cb, Re)

186-T. Nonferrous Role in "Birds". *Steel,* v. 142, Apr. 14, 1958, p. 96-97.

U. S. missile program. (T24e, 17-57; Al, Mg, Ti, Be, Cu)

187-T. (French.) **Applications of Molybdenum and Its Compounds in the Chemical Industry.** (Continued.) H. Beduneau. *Revue des Produits Chimiques,* v. 61, Jan. 31, 1958, p. 3-7.

49 ref. (To be continued.) (T29, 17-57; Mo)

188-T. (German.) **Aluminum, New Application Possibilities.** H. A. Kirsch. *Chemische Rundschau,* v. 11, Jan. 1958, p. 1-4.

Aluminum as a construction material and its application in the manufacture of large equipment. (T26, 17-57; Al-b)

189-T. (German.) **Aluminum and Copper for Long-Distance Cable Lines.** H. Mors. *Metall,* v. 11, Nov. 1957, p. 949-954.

Designs for the masts and clamps for high-voltage power transmission. (T1b, 17-57; Al-b, Cu-b)

190-T. (German.) **Manufacturing Aluminum Sheathed Cables.** H. D. Feldmann. *Metall,* v. 12, Mar. 1958, p. 204-208.

Object of sheathing cables. Lead is more resistant to corrosion than aluminum. Advantages of Al include lower specific weight, higher mechanical strength, high conductivity, which permit economies in production and transport costs. (T1b, 17-57, Al)

191-T. Conference on Aircraft Manufacture. *Light Metals,* v. 21, Apr. 1958, p. 118-123.

Papers from conference on "Problems of Aircraft Production" by Institution of Production Engineers. (T24, 17-57; EG-a39)

192-T. Aluminum in Rockets and Missiles. Don Fabun. *Modern Metals,* v. 14, Apr. 1958, p. 30-44.

Results of recent survey of Al usage in 60 missile programs reflect applications, advantages, limitations of the metal. (T24e, 17-57, Al)

193-T. Big Role for Magnesium in Missiles. *Modern Metals,* v. 14, Apr. 1958, p. 46-52.

Uses of Mg in current missile production, possible potentials, making fullest use of physical properties. (T24e, 17-57; Mg)

194-T. Outlook for Titanium in Missiles. R. C. Durstein. *Modern Metals,* v. 14, Apr. 1958, p. 64-65.

(T24e, 17-57; Ti)

195-T. This Bolt Holds Better. *Steel,* v. 142, Mar. 31, 1958, p. 82-83.

Knurled shank cold works bolt hole and greatly improves resistance to shear in bolted joints. Lab tests

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

and first applications indicate some reduction in labor costs. (T7f, Q27a)

196-T. (Czech.) **Manufacture of High-Quality Seamless Tubes for Petroleum and Geological Research.** Osvald Pejcoch and Josef Cerveny. *Hutnické Listy,* v. 13, Jan. 1958, p. 2-9.

Manganese alloy steel tubes are given a special normalizing treatment. 10 ref. (T28p, J24; *Mn,* AY)

197-T. (Czech.) **Breakdown of Welded Bridges in Belgium.** J. Sevcik. *Zvaranie,* v. 7, Jan. 1958, p. 15-18.

(T26p, 7-51, 9-71)

198-T. (French.) **Metalloplastic Thread.** Maurice Victor. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 67-72.

Aluminum thread coated with transparent acetate film is low-cost, corrosion resistant, smooth, colorfast, versatile, lightweight. Can be reduced to a 0.0078 in. width. (T10, 17-57; Al-b)

199-T. **Zircaloy Tube for Nuclear Power: Extrusion and Coldworking Present Many Problems.** J. S. Rodgers. *Canadian Metalworking,* v. 21, Apr. 1958, p. 24, 26.

(T11q, F24, G-general, 1-67, 17-57; Zr-b)

200-T. **Replacing Heavy Metal Castings by Light Alloy Castings.** Hermann Kessler. *Light Metals,* v. 21, Feb. 1958, p. 57-59. (From *Giesserie,* v. 42, 1955, p. 307-309.)

Previously abstracted from original. See item 104-T, 1955. (T-general, Al)

201-T. **Production of Ball and Roller Bearings.** *Machinery (London),* v. 92, Mar. 1958, p. 640-652.

Methods and equipment at Hoffmann Mfg. Co., Chelmsford, Essex; use of stainless steel, mild steel and brass. (T7d, 17-57; SS, CN, CU-n)

202-T. **Semiconductors—Revolution at Your Elbow.** *Product Engineering,* v. 29, Apr. 14, 1958, p. 60-63.

Use of semiconductors for transistors, solar cells, rectifiers, thermoelectric junctions, thermistors and electroluminescent panels. (T1, 17-57; EG-j)

203-T. **Preview of Space Age Metals.** *Steel,* v. 142, May 5, 1958, p. 86-87.

Tables indicating major airframe components and their alloys, major jet engine components and their alloys, major missile components and their alloys. (T24; 17-57)

204-T.* **Molybdenum for Aircraft Gas Turbine Applications.** R. T. Begley. Paper from "The Metal Molybdenum", American Society for Metals, p. 408-419.

Main advantages of Mo and Mo-base alloys for jet engine applications are excellent high-temperature strength, good fatigue properties, high modulus of elasticity. Disadvantages are lack or oxidation resistance, relatively high density, difficulty of obtaining high-strength joints. (T24b, 17-57; Mo)

205-T. (French.) **Light Metal Coating of Auxiliary Dams at Rheinaus Hydroelectric Plant.** R. Vogtlin. *Aluminium Suisse,* v. 7, Nov. 1957, p. 212-218.

(T26s, 17-57; EGa-39, 8)

206-T. (French.) **Aluminum and Its Application in Dams.** Lothar J. Streuli. *Aluminium Suisse,* v. 7, Nov. 1957, p. 219-224.

Light weight, resistance to wear and corrosion properties of Al have led to its replacing wood and steel. (T26s, 17-57; Al)

207-T. (French.) **Light Metal Lock Gates.** Ernst Amstutz. *Aluminium Suisse,* v. 7, Nov. 1957, p. 225-229.

Locks for dams made partly of Al alloys resist galvanic corrosion. (T26s, 17-57, R1a; Al)

208-T. (French.) **Lead Pipes in Chemical and Construction Industries.** J. Chauvin. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 359-361.

(T26, T29, 17-57; Pb, 4-60)

209-T. (French.) **Aircraft Production Techniques in French Plants.** Paul Badré. *Metallurgie et Construction Mecanique,* v. 90, Mar. 1958, p. 181-193.

(T24)

210-T. (French.) **Possibilities Offered by Light Metals in Automobile Decoration.** Charles Guinard. *Revue de l'Aluminium,* v. 35, Mar. 1958, p. 303-309.

(T21a, T21c, 17-57; Al, Mg)

211-T. (Russian.) **Solution of Problems of Rail Steel.** D. S. Kazarnovsky. *Stal',* Feb. 1958, p. 138-144.

Lengthening the life of rail steel by means of heat treatment of carbon steel rails, use of alloy steels for most strained sections of tracks and improvement of rail shape. 17 ref. (T23g, J-general, 17-51, 17-57; AY, CN)

W Plant Equipment

197-W.* **International Views on Foundry Ventilation.** Antonio Riggi. *Foundry Trade Journal,* v. 104, Feb. 27, 1958, p. 237-243.

Smoke and dust-exhausting equipment installed in a cast iron and aluminum alloy foundry. 10 ref. (W13c, E-general; CI, Al)

198-W. **Foundry Goggles. Pt. 2.** *Foundry Trade Journal,* v. 104, Mar. 6, 1958, p. 259-269.

Preliminary report of British committee. Plastic lenses afford more protection against both solid and molten metal than do either toughened or laminated glass lenses. (W13k, E-general)

199-W. **Combination Gas and Electric Heating in Rotary Hearth Furnace for Treating High Speed Steel Bearing Rings.** *Industrial Heating,* v. 25, Mar. 1958, p. 496-499.

(W27, 1-52, T7d; TS-m)

200-W. **New Methods in Maintenance of Refractories in Steel Plants: Pt. 4.** *Industrial Heating,* v. 25, Mar. 1958, p. 579-584.

Evaluation of cast refractory and brick linings; refractory and installation costs; increase in hot top value during lining life and practicability of using reduced hot tops. Castable replacement costs are 40% less than those using refractory shapes, due to elimination of skilled labor required to brick the tops and through greater utilization of existing nonskilled labor. (W19c; ST, RM-h)

201-W. **Arc Image Furnace Produces Temperatures Above 7000° F.** *Industrial Heating,* v. 25, Apr. 1958, p. 728-730, 734.

(W18s)

202-W. **Instrumentation in Vacuum Induction Melting.** *Industrial Heating,* v. 25, Apr. 1958, p. 732-734.

Instrumentation for a 1-ton induction vacuum furnace comprises a small top-charging chamber separated from the main melting chamber by a large horizontal gate valve. (W18a, X-general, 1-73)

203-W. **A New Single-Operation Precision Blanking Press.** *Machinery (London),* v. 92, Mar. 28, 1958, p. 724-726.

Hydraulic press was developed to produce blanks from sheet or strip metal with an edge finish equivalent to that obtained by shaving or grinding. Precision blanking applied to metals with thicknesses varying from 0.06 to 0.315 in., with output of 600 to 800 pieces per hr. Four sizes have been developed; the latest types have provisions for mounting strip-feeding equipment. (W24g, 1-70, G2h)

204-W. **Equipment for Fusion Welding Large Pipes.** *Machinery (London),* v. 92, Apr. 4, 1958, p. 785.

(W29, K-general, 1-52; ST, 4-60)

205-W.* **Automation of a Barrel Plating Line.** *Metal Finishing Journal,* v. 4, Mar. 1958, p. 75-79.

Automatic, independent - cycling machine for Cd barrel plating. (W3b, L17; *Cd,* 18-74)

206-W. **Conveyorized Die-Casting Foundry.** *Metal Industry,* v. 92, Feb. 14, 1958, p. 127-129.

(W12r; E13; 18-67)

207-W. **Electric Furnace Developments.** P. F. Hancock. *Metal Industry,* v. 92, Feb. 28, 1958, p. 167-169.

Progress in arc, induction and resistor furnaces. (W17j; W18a; W18s)

208-W. **Large Aluminum Plate.** *Metal Industry,* v. 21, Mar. 1958, p. 231-234.

Five new pieces of equipment installed in a plant for production and testing large Al plate. (W23b; Al, 4-53)

209-W. **Fourslide Press or Progressive Die?** J. H. v. d. Burgt. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 165-178.

(W22p, W22a)

210-W. **Nozzle Changes Pay Off.** *Steel,* v. 142, Apr. 21, 1958, p. 144, 146.

Nozzle material, shape, refractoriness, quality, size and effect of these variables on ingots and the steels rolled from them. (W19e, D9; NM-h, ST, 5-59)

211-W. **An Assessment of Various Furnace Linings.** Edgar Spetzler. *Stahl und Eisen,* v. 76, Dec. 27, 1956, p. 1734-1740. (Iron and Steel Institute, Translation no. 554.)

Previously abstracted from original. See item 67-W, 1957. (W18, D2g; RM-h)

212-W.* (German.) **Modern Melting Practice in the Production of Metals and Alloys of Extremely High Purity.** W. Scheibe. *Metall,* v. 11, Oct. 1957, p. 854-859.

In a high-vacuum d-c arc furnace for laboratory use, a water-cooled copper mold is used instead of a crucible. The material to be melted is charged through a self-consuming electrode, which is fed automatically, maintaining a constant arc. A stirring motion can be created through an electric coil around the outside of the mold. The output of the furnace can be regulated between 3 and 4 kg. per min. 3 ref. (W18s, X24f, 1-73)

213-W. (German.) **Choice of Steels for Molds and Hot Working Dies for Centrifugal Casting.** J. Klarding. *Metall,* v. 12, Jan. 1958, p. 12-20.

With carbon steels the hardening process can be repeated more times before cracking than with alloy

steels; the aluminum content has a bearing on the number of repeated hardenings until brittle. 4 ref. (W19g, W19n, 17-57, E14; ST)

214-W. Change-Over of O. H. Furnaces From Oil to Natural Gas Firing. V. P. Borodin. *Stal'*, no. 2, 1957, p. 124-129. (Iron and Steel Institute, Translation no. 538.)

Previously abstracted from original. See item 479-W, 1957. (W18r, 1-52, RM-m35; ST)

215-W. Use of High-Alumina Bricks in Hot Blast Stoves. A. I. Kulik *Stal'*, no. 7, 1956, p. 582. (Iron and Steel Institute, Translation no. 551.)

Previously abstracted from original. See item 176-W, 1957. (W17; Fe, RM-h)

216-W. Behavior of the Surface of Rolls in Rolling. Wilhelm Hesse. *Stahl und Eisen*, v. 77, May 30, 1957, p. 715-727. (Iron and Steel Institute, Translation no. 583.)

Previously abstracted from original. See item 286-W, 1957. (W23k, 17-7; ST, 9-71, 9-72)

217-W. Economic and Technical Results of Operation of Waste-Heat Boilers and High-Temperature Cooling Plants Installed on O. H. Furnaces. Max Zur. *Stahl und Eisen*, v. 77, Jan. 24, 1957, p. 95-100. (Iron and Steel Institute, Translation no. 584.)

Previously abstracted from original. See item 111-W, 1957. (W10, 18-67, 17-53)

218-W. Practical Experiences With and Damage Sustained by Waste-Heat Boilers and High-Temperature Cooling Plants for O. H. Boilers. Werner Heil. *Stahl und Eisen*, v. 77, Jan. 24, 1957, p. 84-91. (Iron and Steel Institute, Translation no. 611.)

Previously abstracted from original. See item 109-W, 1957. (W10, 18-71)

219-W. Method of Cleaning the Waste-Heat Boiler Installed on an O. H. Furnace. Paul Jacobi. *Stahl und Eisen*, v. 77, Jan. 24, 1957, p. 91-95. (Iron and Steel Institute, Translation no. 612.)

Previously abstracted from original. See item 110-W, 1957. (W10, 18-71)

220-W. Experiences With the Application of Basic Brickwork in O. H. Furnaces. Karl Leitner. *Neue Hutte*, v. 2, Feb-Mar. 1957, p. 142-154. (Iron and Steel Institute, Translation no. 615.)

Previously abstracted from original. See item 294-W, 1957. (W18r, 1-52; RM-h)

221-W. Hot Cooling of Openhearth Furnaces. S. I. Moiseyevich. *Stal'*, no. 7, July 1957, p. 658-682. (Iron and Steel Institute, Translation no. 691.)

Previously abstracted from original. See item 485-W, 1957. (W18r, W11; ST)

222-W. Continuous Wire Rolling Train at the Wendel Plant at Jouef. J. Boulange and M. Blau. *Technique Moderne*, v. 49, July 1957, p. 63-65. (Iron and Steel Institute, Translation no. 751.)

Previously abstracted from original. See item 457-W, 1957. (W24k, 1-52)

223-W. Continuous Wire Mill of the Societe Metallurgique de Normandie. L. Boulez. *Technique Moderne*, v. 49, July 1957, p. 66-69. (Iron and Steel Institute, Translation no. 752.)

Previously abstracted from original. See item 458-W, 1957. (W24k, 1-52)

224-W. Montataire Works of Usinor. Continuous Pickling Line; New Four-Stand Mill; Annealing Plant; Skin Pass Mill. M. Mallet. *Technique Moderne*, v. 49, July 1957, p. 87-93. (Iron and Steel Institute, Translation no. 756.)

Previously abstracted from original. See item 462-W, 1957. (W23f, 1-52)

225-W. New Developments in Furnace Construction for Drop Forgings. E. Pflaume. *Fertigungstechnik*, v. 7, Feb. 1957, p. 63-64. (Iron and Steel Institute, Translation no. 868.)

Previously abstracted from original. See item 322-W, 1957. (W20h, 1-52, F22n)

226-W. (Czech.) **Interchangeable Time Regulating Panels for Asynchronic Control of Spot Welding Machines.** Karel Jarsky. *Zvaranie*, v. 7, Feb. 1958, p. 40-43.

(W29c, K3n)

227-W. (French.) **13,200-Ton Extrusion Press at Madison's Magnesium Plant.** Andre Chevrier. *Revue de l'Aluminium*, v. 35, Feb. 1958, p. 197-201.

New powerful and complex equipment to extrude large-size Mg shapes with integrated stiffeners for aircraft industry. (W24g, F24, T24a; Mg)

228-W. (Russian.) **Use of Carbon Blocks in Construction of Blast Furnace.** A. N. Red'ko. *Metallurg*, Jan. 1958, p. 7-10.

(W17g; RM-h39)

229-W. (Russian.) **Cooling Blast Furnace Tuyeres by Evaporation.** B. I. Ragin. *Metallurg*, Jan. 1958, p. 10.

(W17g, W10f)

230-W. (Russian.) **More Effective Control of Temperature of Blast Heaters.** P. G. Baranovskii. *Metallurg*, Jan. 1958, p. 11-12.

(W17g, S16)

221-W. (Russian.) **Machine for Cleaning Tin Plate.** M. I. Udovenko. *Metallurg*, Jan. 1958, p. 30-32.

(W3d, L12; *Sn*, 8-15)

232-W. (Russian.) **Improvements in Blast Furnace Charging Apparatus.** L. Ya. Matusevich. *Metallurg*, Feb. 1958, p. 5-7.

(W17g, D1a)

233-W. (Russian.) **Casting Molds of New Construction.** A. S. Korzhavin. *Metallurg*, Feb. 1958, p. 18-19.

(W19c)

234-W. (Russian.) **Modernization of Gear Drive for Rolling Mills.** S. M. Ruvinskii, I. S. Starets and D. I. Shulyatskii. *Metallurg*, Feb. 1958, p. 24-26.

(W23n)

235-W. (Russian.) **Equipment of Rolling Mills With Chromium-Plated Grooves.** M. A. Tylkin. *Metallurg*, Feb. 1958, p. 27-28.

(W23k; *Cr*, 8-62)

236-W. (Russian.) **Use of Hard Metals in Punch Press Construction.** S. S. Chetverikov and N. K. Foteev. *Vestnik Mashinostroeniya*, Feb. 1958, p. 40-42.

Reinforcing presses with hard metal gives much greater strength than construction with toolsteels. (W24g, 17-57; EG-d37)

237-W. Applications of Furance Atmospheres. Pt. 4. C. E. Peck. *Industrial Heating*, v. 25, Feb. 1958, p. 258-268.

Features of furnaces used with controlled atmospheres emphasizing importance of proper correlation between furnace design and application. (W27n, J2k)

238-W. New Methods in Maintenance of Refractories in Steel Plants. Pt. 3. *Industrial Heating*, v. 25, Feb. 1958, p. 355-360.

Abstracts of papers presented at Refractories and Masonry Session I, 40th National Open-Hearth Conference, AIME, Pittsburgh, Apr. 8-10, 1957, dealing with performance of different types of pouring nozzles. (W18n, W18r; RM-h, 18-71)

239-W. Trends in Steel Mill Power Plants. Howard G. Kitt and Robert W. Worley. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 90-97.

Recent development of power plants indicates trend toward higher pressures and temperatures, larger capacity and more efficient equipment. (W11, 1-52; ST)

240-W. Electrical Drive System for a High-Speed Combination Rod Mill. A. F. Kenyon and H. J. Oakes. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 123-136.

Power system for rod mill; rapid response to operator control and to load changes; accuracy with which speed and other variables can be maintained. (W23n, W23d)

241-W.* Development of Automatic Thickness Controls for Strip Mills. I. G. Orellana. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 144-150.

Automatic control for hot strip mills is still being developed, but good results are being obtained. 96% of strip produced at one mill has within $\pm 1/2\%$ of nominal thickness. (W23c, X20c)

242-W. Handling Titanium Ingots. *Light Metals*, v. 21, Feb. 1958, p. 56-57.

Electric power pilot truck with attachments for handling Ti ingots. (W12n, 1-52; Ti, 5-59)

243-W. Electric Furnace Developments: Review of Progress in Arc, Induction and Resistor Furnaces. P. F. Hancock. *Metal Industry*, v. 92, Mar. 1958, p. 187-189.

(Concluded.) (W27j, W27k)

244-W. Radio-Frequency Induction Heaters. R. P. P. Ellis. *Metal Treatment and Drop Forging*, v. 25, Apr. 1958, p. 145-147, 156.

(W28s)

245-W. Machine Tool Progress. George F. Nordenholt. *Ordnance*, v. 42, Mar-Apr. 1958, p. 910-913.

(W25)

246-W. Aluminum Welding Cable. J. G. Stone. *Welding Journal*, v. 37, Apr. 1958, p. 320-327.

Electrical and physical properties, advantages of Al welding cable. (W29q, 17-57; Al-b, 4-60)

247-W. Frequency-Converter Welding Control Using Counting Tubes. L. R. Broniak and W. A. Chaisson. *Welding Journal*, v. 37, Apr. 1958, p. 336-341.

(W29c, X13j, K3n)

248-W. Practical Welder and Designer. Manipulator for Automatic Welding. Harry S. Powell. *Welding Journal*, v. 37, Apr. 1958, p. 359-361.

(W29k)

249-W. (German.) **Molding Machines for Pressure Casting. Contribution to the Choice of Materials and Heat Treatment of Pressure Casting Machines.** *Giessereitechnik*, v. 4, Jan. 1958, p. 7-10.

(W19f)

250-W. (German.) **Continuous Pusher-Type Heating Furnace With Fully Automatic Control and Ceramic Skid Rails.** Fritz Fechter. *Stahl und Eisen*, v. 78, Mar. 6, 1958, p. 299-303.

(W20h, F21b)

(*)Articles Available Through Photocopy Service; See Coupon, p. 59.

251-W. (Japanese.) **Extension Die With Movable Wall.** Mahito Kunogi. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 757-763.

The movable wall can not only reduce friction, but also can form shells in various shapes—screw, gear and cone, in one operation. 5 ref. (W24n, F24b)

252-W. (Russian.) **Rebuilding Continuous Furnaces.** P. K. Kuznetsov and Y. Ya. Klassen. *Metallurg,* Feb. 1958, p. 28-29.

(W17, W18, W27, 1-61, 18-72)

253-W. (Russian.) **Modern Pilger Mills.** Iu. M. Matveev. *Stal',* Feb. 1958, p. 151-155.

5 ref. (W23h)

254-W. (Russian.) **Die Steels and Presses Used for Drop Forging.** A. S. Nikolaev. *Stal',* 1958, p. 162-163.

(W22q, W22a, 17-57; TS)

255-W. (Russian.) **Improvement of Drawing Tools.** A. I. Bogdashkin. *Stal',* Feb. 1958, p. 169-170.

(W24n)

256-W. (Russian.) **Technical Development of Heating Facilities of Rolling Mills.** K. M. Golosman. *Stal',* Feb. 1958, p. 171-178.

(W10e, W23)

257-W. (Russian.) **Cast Steel Rolls for Rolling Mills.** V. N. Saveiko and M. V. Frolova. *Stal',* Feb. 1958, p. 179-184.

11 ref. (W23k, 17-57; ST, 5-60)

258-W. (Russian.) **Ceramic Semiconductor Heaters in Electric Furnaces.** A. Ya. Kuznetsov, L. A. Pafomova and L. M. Kalinina. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1497-1498.

(W27k, W27p)

X Instrumentation

Laboratory and Control Equipment

29-X. Interferometer for Checking the Parallelism of Slip Gauges. *Machinery (London),* v. 92, Feb. 14, 1958, p. 375-377.

(X20a, S23)

30-X. (Russian.) **Device for Investigation of Damping Vibration in Metals.** M. I. Kurmanov, I. V. Navrotskii and Zh. F. Yanushevskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 101-103.

(X28m)

31-X. (Russian.) **Device for Photographing Surface of Cylindrical Objects During Corrosion Tests.** S. N. Alekseev. *Zavodskaya Laboratoriya,* Jan. 1958, p. 108-109.

(X5g, R11)

32-X.* Instrumentation for the Melting of Non-Ferrous Metals. D. W. Brown. *British Foundryman,* v. 51, Mar. 1958, p. 128-136.

Instruments available for combustion control, temperature measurement and control (especially thermocouples), nitrogen degassing gages, and melt-quality determination. (X9, X13, E10; EG-a38)

33-X. Three-Dimensional Toolmaker's Microscope. Walter P. Christoph. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 684-686.

(X3r)

34-X. Measuring Tapers Without Tears. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 688-690.

Device which simplifies difficult measuring problems. (X20a; ST)

35-X. Russian Automatic Machine Grades Cylinder Rollers. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 691-692.

In roller grading machines at the Moscow automatic bearing plant, measuring airjets actuate solenoids to direct each roller into one of 23 hoppers according to a length of tolerance of 0.003 in. and a diameter tolerance of 0.00008 in. Production rate is 1800 rollers per hr. (X6, T7d; 18-74)

36-X. (German.) **Strain Gages for Industry.** Gisbert Kaliske. *Industrieblatt,* v. 58, Mar. 1958, p. 73-77.

Constructions of apparatus; measuring methods. (X28j)

37-X. (German.) **Modern Gages and Controllers.** *Industrieblatt,* v. 58, Mar. 1958, p. 83-85.

Impressions from International Congress on measuring techniques and automation in Dusseldorf, 1957. Short description of apparatus; strip thickness regulator, dosimeter for gamma and X-rays, controls using punched cards, electronic counting devices, electronic precision indicator, sorting device and noise tester. (X20, X2, X6)

38-X. (German.) **Gages and Testing Apparatus for Efficient Manufacturing.** *Industrieblatt,* v. 58, Mar. 1958, p. 85-87.

Precision gages, including screw gages, optical gages, "tool microscope", hardness testers, mounting and measuring projectors and sorting machines. (X20, X6)

39-X. (Russian.) **Coercive-Force-Meter to Control Quality of Thermal Treatment of Steel Parts.** A. M. Ylgard. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1054-1505.

(X11, J-general, S13h; ST)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers: c/o A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

METAL SALES AND MARKET RESEARCH: U. S. affiliate of large European producers requires man with metallurgical sales experience for domestic sales of aluminum mill products. Metallurgical degree or mill experience desirable. Write fully details of education, experience. Company benefits. Salary commensurate with qualifications. Box 6-5.

ALUMINUM SALES: Primary metals producer with national warehouse system offers fine advancement opportunities for aggressive sales specialists with at least five years aluminum sales experience or the equivalent at either mill or warehouse level, preferably the latter. Moderate travel within specific territory. Salary open. Mail detailed resume, all contacts held in strict confidence. Box 6-10.

METALLURGISTS: Naval Air Material Center engaged in extensive program of aeronautical research, development, experimentation and test operations for the advancement of Naval aviation, needs metallurgists (salaries $5335 to $8645 per year) for work on high-strength steels, precision castings, heat resistant alloys, oxidation resistant coatings for molybdenum, inert and shielded metal arc and resistance welding. Positions include research, development and evaluation-type duties. Interested persons should file Application for Federal Employment, Standard Form 57, with Industrial Relations Dept., Naval Air Material Center, Naval Base, Philadelphia 12, Pa. Applications may be obtained at the above address or first and second-class post offices.

West

METALLURGIST: Major aircraft and missile manufacturer has attractive opportunity in research and development work. Applicant must have experience in analysis and writing of material and process specifications plus at least general familiarity with most of the following: heat treating, forming, failure analysis, aluminum alloys, stainless steels, low-alloy steels, titanium alloys, ultra-high-strength steels and high-temperature alloys. Location in smog-free El Segundo, Calif., where it's warm in winter and cool in summer, adjacent to Los Angeles airport. Send resume to: P. B. White, B-140, Douglas Aircraft Co., Inc., El Segundo, Calif.

Midwest

FOUNDRY METALLURGICAL ENGINEER: For nonferrous foundry. Must have experience on problems of gating, risering, pouring, sands and cores. B.S. degree in engineering required. Must have minimum of five years experience. Age 25-45. Excellent opportunity for capable and energetic man. Salary open. Please reply stating personal data, qualifications, experience, salary expected and availability in first letter. All inquiries will be held in strict confidence. Write to: Ampco Metal, Inc., Personnel Dept., 1745 South 38th St., Milwaukee 46, Wis.

TEACHING POSITION: In nuclear metallurgy as part of M.S. program in nuclear engineering. Background in one or several of the following fields also desirable: X-ray, thermodynamics, mechanical metallurgy or solid state. Research support from university or government funds. Ph.D. degree preferred. Salary and rank open. Write: Chairman, Dept. of Mining & Metallurgy, University of Wisconsin, 1509 University Ave., Madison, Wis.

South

TEACHING POSITION: Assistant professor of metallurgy in liberal arts college in upper South. Young Ph.D. with physical chemistry training desired. Opportunity for basic research. Box 6-15.

RESEARCH PROFESSOR IN PHYSICAL METALLURGY: To take charge of versatile laboratory and conduct graduate courses. Ph.D. required. Provides association with leading university in South where living and climatic conditions are the best. Ten months residence with 12 months salary. Box 6-20.

POSITIONS WANTED

TEACHING: Of technical Russian and metallurgy desired. Metallurgist, Ph.D., Russian-born U. S. citizen, educated both in Russia and U. S. Research and production experience in industry, government and schools. Reading knowledge of French, German. Also interested in translating, abstracting, editing work. Box 6-25.

MANUFACTURING EXECUTIVE: A 39-year old M.I.T. graduate seeks challenging administrative position. Fifteen years intensive experience in production administration, labor relations, testing and quality control, design engineering, applied research and project development in nonferrous metals production. Excellent coordinator. Box 6-30.

METALLURGIST: Indian national, Ph.D. (Sheffield), age 39, married, family. Ten years diversified experience in melting, casting, operational and development duties in iron and steel industry, eight years university teaching and research. Accustomed to dealing with all levels from executive to shop personnel. Desires

responsible position with progressive concern in technical service or in information, development, liaison, sales or similar work. Willing to travel, go abroad or relocate if necessary. Box 6-35.

HEAT TREAT SPECIALIST: Metallurgist with a decade of industrial experience. Practical heat treating to supervision, very successful selling of capital equipment and supplies to sales management. Interested in growing with a progressive, well-established organization. Married, mature, moderately manageable. Box 6-40.

METAL FINISHING ENGINEER: Chemistry and metallurgy background, 15 years diversified experience in production and technical control of large and small electroplating, metal joining and heat treating facilities. Considerable sales liaison, research and development ability. Desires technical service-sales position in New York City vicinity. Box 6-45.

ALUMINUM METALLURGIST: Chief metallurgist and laboratory manager for British firm from 1953 to 1957, especially skilled in aluminum alloying, extrusion and heat treatment. Polish born, mechanical engineer, Warsaw University. Ph.D. in metallurgy, University of London. Recently emigrated to U. S. Writes and speaks English fluently. Box 6-50.

MECHANICAL ENGINEER: With 29 years experience in design, research, production, quality control, cost reduction, sales phases in engineering of high production home appliances, electronics and heavy machinery. Strong background in manufacturing materials, processes and fabrication. Desires creative design, liaison, sales or administrative engineering work. Prefers Connecticut but will relocate. Box 6-55.

TECHNICAL SERVICE MANAGER: Proven ability to resolve customer complaints and to analyze product failures. Experienced field man with buyer-seller metallurgical engineering background in metals, welding, adhesive bonding, specialized equipment, organic materials. Will travel. Lives in New York City area. Box 6-60.

RESEARCH ENGINEER: Six years experience in basic and applied corrosion research. Technical papers. Group leader. General knowledge of X-ray diffraction, spectroscopy and chemical analysis. Ph.D. in metallurgy, age 38, married. Desires position in research and development. Box 6-65.

CHEMICAL-METALLURGICAL ENGINEER: M.S. degree, extensive specialized education in metallurgy, chemistry, chemical engineering. Experienced in consumable electrode melting, casting, metallurgy of reactive metals, high-temperature reactions and thermodynamics, high-temperature materials, molten salt reactions, corrosion and electrochemistry. Research development, administrative experience. U. S. citizen, cleared for security, 34, single. Box 6-70.

METALLURGICAL ENGINEER: B.S. degree, age 29, family, veteran. Two years engineering laboratory experience in material testing and evaluation, failure analysis and metallography of carbon and alloy steels. Desires position in production or applied research and development. Desires to relocate in Eastern Pennsylvania or New Jersey. Box 6-75.

METALLURGICAL ENGINEER: B.S. degree, age 32, married, family. Six years diversified aircraft experience in process and material control and development work. Desires to relocate. Available immediately. Box 6-80.

METALLURGICAL ENGINEERING SUPERVISOR: B.S. degree, veteran, married, family. Eight years diversified aircraft metallurgy background, six years as laboratory supervisor. Extensive product, process and contact experience. Qualified engineering supervisor with strong cost consciousness. Desires responsible staff or production assignment with smaller company, preferably in New York, New Jersey, but will consider relocating. Box 6-85.

METALLURGIST: B.S. degree in metallurgical engineering plus eight years experience which includes supervisory work. Familiar with alloy and stainless steels, high-temperature alloys and refractory metals. Broad background in metal selection and evaluation, heat treatment, welding and brazing. Desires responsible position in Northeast. Current salary $9600. Box 6-90.

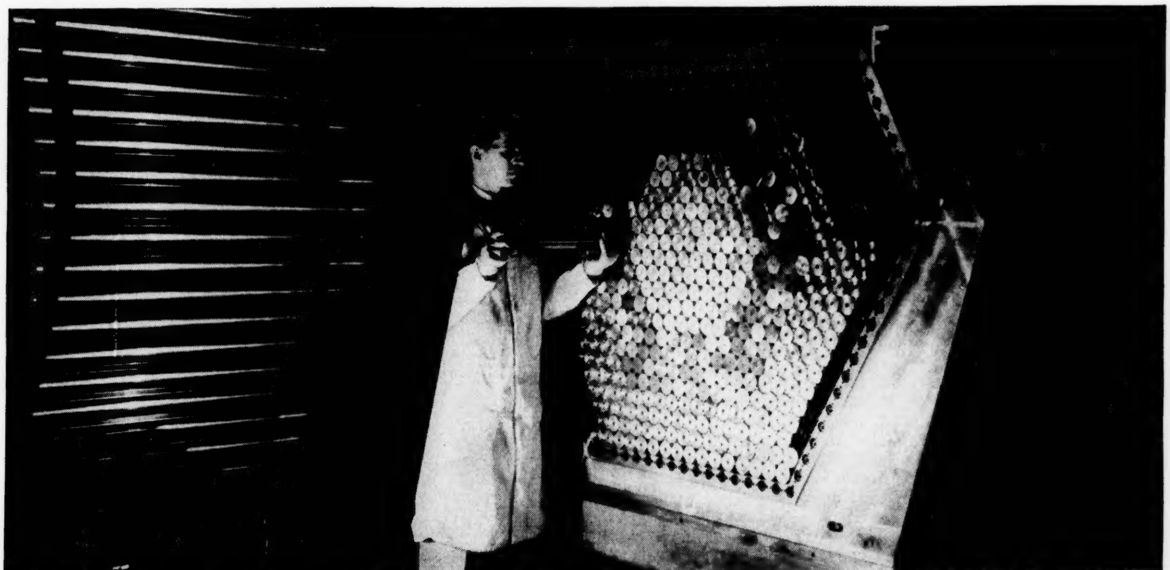
METALLURGICAL ENGINEER: B.S. degree, age 27, married, family. Three years experience with ferrous and nonferrous alloys, including high-temperature material. Background includes failure analysis, manufacturing problems, material evaluation, laboratory supervision. Currently employed in Canada, would like to locate in Eastern Canada or U. S. in an interesting position. Box 6-95.

MECHANICAL ENGINEER: Degree, 20 years experience in practical plant metallurgy, including specification writing and inspection of materials, plant problems. General plant experience in machining, fabricating, heat treatment, corrosion, brazing and design. Experience in carbon and alloy steels, stainless, nonferrous. Will relocate. Box 6-100.

METALLURGICAL ENGINEER: Three years materials and processes advisor to branch of armed force inspection offices. Three years metallurgist in aircraft manufacturer control laboratory. Nine years in nonferrous metallurgy supervising plant control, quality control, instrumentation, air pollution control, administrative functions (personnel, accounting, purchasing, safety). Experience includes continuous casting, metal powders, alloy development. Box 6-110.

MECHANICAL METALLURGIST: Ph.D., age 37. Twelve years experience in research and teaching. Forty publications. Desires position at university or research institute. Box 6-115.

METALLURGIST: Age 27, married, family. Graduated recently as metallurgical engineer from leading German university. Has completed five years study, one year practical experience both in Germany and U. S. Desires position in steelmaking (preferably open-hearth), with eventual aim of getting into research. Speaking, reading knowledge of English is good. Excellent references. Box 6-120.



LEARN FROM AN EXPERT

GEORGE F. MELLOY

PREPARE FOR A BETTER JOB
AND MORE PAY IN THE HEAT TREATMENT OF STEEL

George F. Melloy, author of Course 10—Heat Treatment of Steel—has been with the Bethlehem Steel Company for fifteen years. At present he is a Research Engineer. Throughout his affiliation with Bethlehem, Mr. Melloy has been engaged in various capacities in the Specifications and Experimental Departments. He spent twelve years establishing heat treatment procedures for new steels. He is a graduate of Lehigh University with a degree in Metallurgical Engineering and has been an instructor at the Bethlehem Center of the Mineral Industries Extension Services, Pennsylvania State University.

Hence, Mr. Melloy's work on this outstanding course is backed by long years of experience in the field. He has taken the guesswork and uncertainty out of heat treating so that you may go at your work with greater self-confidence and, in doing so, take a tighter grip on success.

TO MEN OF METALS:

W. H. EISENMAN
Secretary
American Society for Metals

Course 10, Heat Treatment of Steel, is another fine example of the authoritative, up-to-the-minute home study courses now being offered by the Metals Engineering Institute. The important material it contains, according to letters received from MEI students, does an outstanding job in preparing ambitious men for successful careers in heat treating. And for good reason.

The Metals Engineering Institute is a division of the American Society for Metals. This is of vital importance to you personally. It means that you, as a student of MEI, receive all the benefits of ASM's forty years' experience in educational success in the metal industry.

Throughout these years, ASM Chapters all over the country engaged in training sessions and class instruction that brought metals engineering knowledge to men of metals engaged in all kinds of metalworking occupations. It was ASM's responsibility to do so . . . because ASM is an *educational* society.

The courses offered by the Metals Engineering Institute are another step in the work ASM Chapters have been doing for four decades—but much extended in scope and material. MEI places ASM's educational program on a much higher, more encompassing level. Now it is possible for any man or woman in the metal industry who wants more knowledge on metalworking subjects to use thoroughly prepared, authoritative and up-to-date courses.

MEI is well founded. Its policies are governed by the MEI Board of Governors, made up of ASM officers and trustees. The MEI National Advisory Council, made up of past-presidents of ASM, advises in the selection of course subjects and authors and provides objective viewpoints for the objectives of MEI.

Every man who helped create MEI, and every man who helps direct MEI today, is devoted to the advancement of metals through education. One of these men is Dr. Anton de S. Brasunas, Director of MEI. He, as in all other cases, was chosen after careful consideration of all qualifications. MEI is backed by metals authorities—by *experts.*

I am confident that these home and in-plant study courses will provide the helpful, authoritative guidance to supply the skilled technical manpower required today—and in the years ahead.

W. H. Eisenman

W. H. EISENMAN, *Secretary*
American Society for Metals

12 COURSES AVAILABLE NOW FOR HOME STUDY AND IN-PLANT TRAINING

Elements of Metallurgy	Metals for Nuclear Power	Titanium	Electroplating and Metal Finishing
Heat Treatment of Steel	Gray Iron Foundry Practice	Stainless Steels	Survey of Steel Plant Processes
High Temperature Metals	Steel Foundry Practice	Oxy-Acetylene Welding	Primary and Secondary Recovery of Lead and Zinc.

THIS MEI CERTIFICATE CAN BE YOURS

CHECK AND MAIL TODAY . . . NO OBLIGATION

Metals Engineering Institute

7301 Euclid Avenue
Cleveland 3, Ohio

☐ I am interested in Course 10, Heat Treatment of Steel. Please send me additional information at once.

☐ I may be interested in other MEI courses. Please send me full information about those courses I have checked at the right.

THESE COURSES ARE AVAILABLE NOW
- ☐ Elements of Metallurgy
- ☐ Heat Treatment of Steel
- ☐ High Temperature Metals
- ☐ Titanium
- ☐ Metals for Nuclear Power
- ☐ Stainless Steels
- ☐ Electroplating and Metal Finishing
- ☐ Gray Iron Foundry Practice
- ☐ Oxy-Acetylene Welding
- ☐ Steel Foundry Practice
- ☐ Primary and Secondary Recovery of Lead and Zinc
- ☐ Survey of Steel Plant Processes

THESE COURSES WILL BE AVAILABLE JUNE 1, 1958
- ☐ Copper, Brass and Bronze
- ☐ Magnesium
- ☐ Tool Steels
- ☐ Fundamentals of Ferrous Metallurgy
- ☐ Arc Welding
- ☐ Blast Furnace Operations

There is no obligation on my part in the return of this coupon.

Name .... Title ....

Street and No. ....

City .... Zone .... State............

Co. ....

MR658

A. S. M. PHOTOCOPY SERVICE

A.S.M. Photocopy Service is available only for articles identified by an asterisk in the A.S.M. Review of Metal Literature. For articles not marked with an asterisk, please refer your request to either the Engineering Societies Library in New York, the John Crerar Library in Chicago, or the Carnegie Library in Pittsburgh.

Please order by item number immediately preceding the asterisk. Payment of $1.00 per page or fraction thereof is requested in advance (number of pages is shown in the journal reference). Where advance payment is not feasible, a surcharge of $1.00 is made to cover billing costs.

All photocopies will be provided in the form of positive paper prints of normal size.

In offering this service the American Society for Metals attempts to follow the "fair use" interpretation of the copyright law. A.S.M. therefore does not sell the photocopies but merely performs the service of copying. The applicant for this service must agree to the following conditions:

1. Not more than one copy of any work is requested.
2. The photocopy is requested solely for personal use in research and study.
3. The applicant will not publish or further reproduce the material without first securing the permission of the copyright owner.
4. The applicant will hold the A.S.M. harmless from any claim that may arise from supplying him with the photocopy.

Photocopy Service Order Form

A.S.M. Photocopy Service
7301 Euclid Ave.
Cleveland 3, Ohio

Please send me one photocopy each of the following documents (which are identified by an asterisk in the A.S.M. Review of Metal Literature):

Item No.	No. of Pages	Cost at $1.00 per page
________	______	________
________	______	________
________	______	________
________	______	________
________	______	________
	Total Cost	________

Payment is enclosed________

Please bill me and add $1.00 to cover billing costs______

I agree to the terms specified above as to "fair use" under the copyright law

____
Signature

Name ________________________
(Please Print or Type)

Address ________________________

Company ________________________

Street ________________________

City________________ Zone_____ State_____